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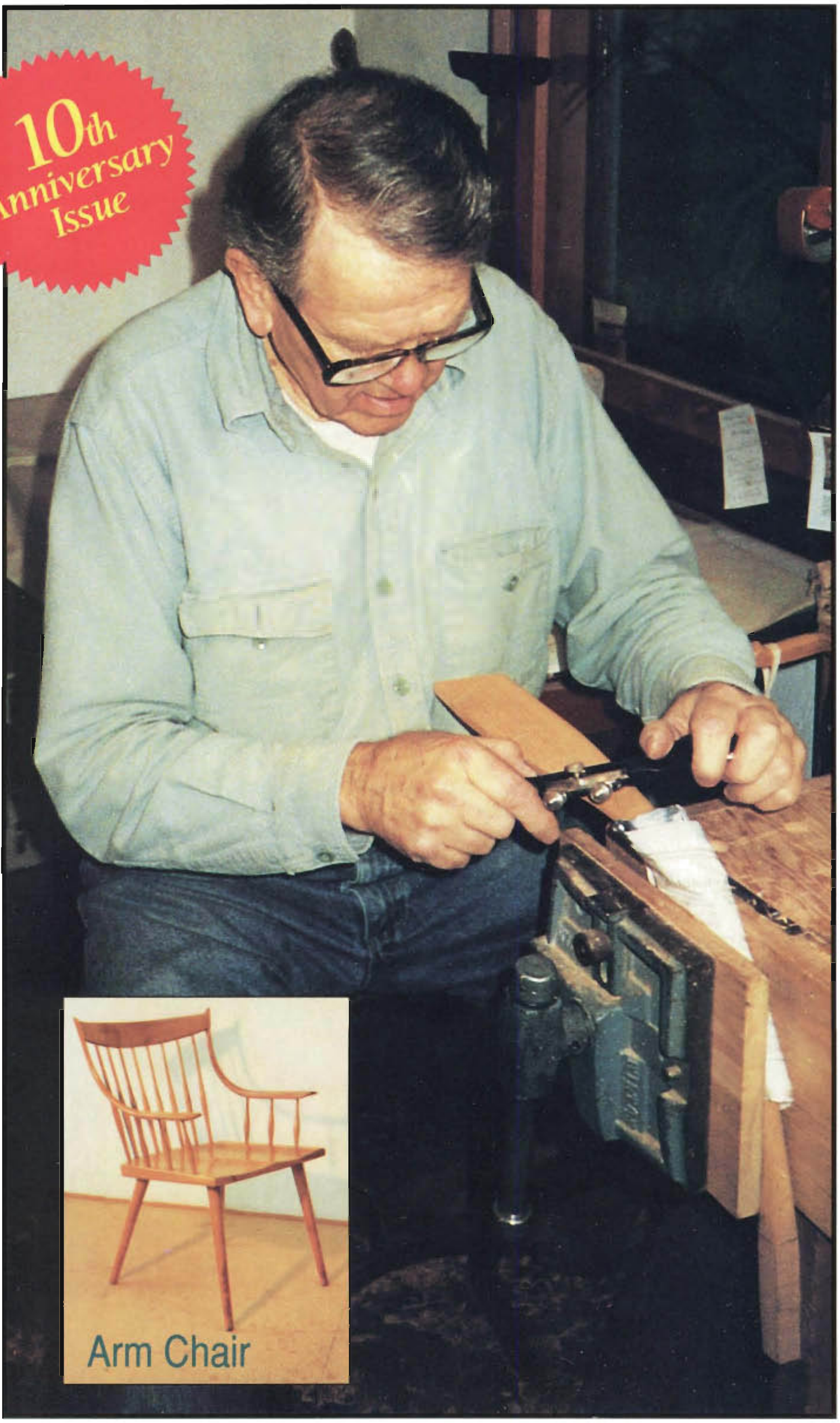

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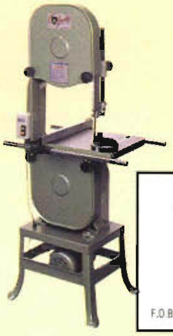

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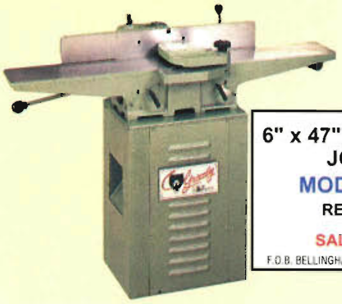

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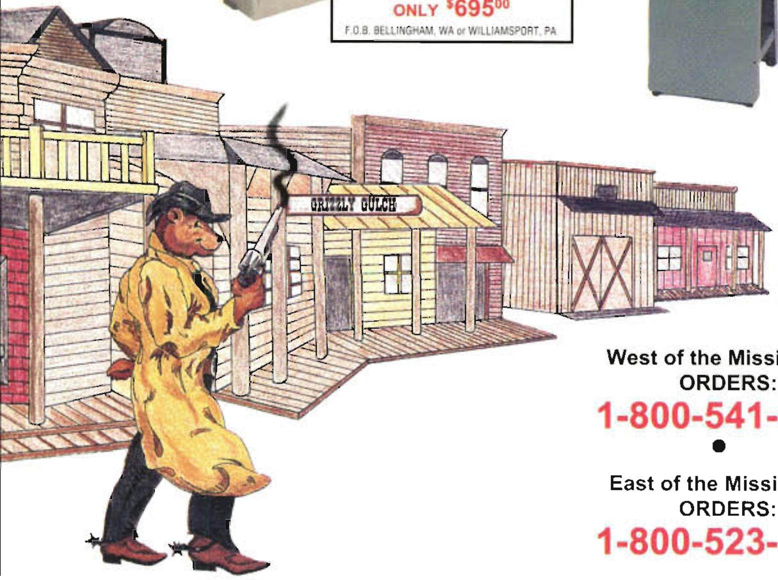

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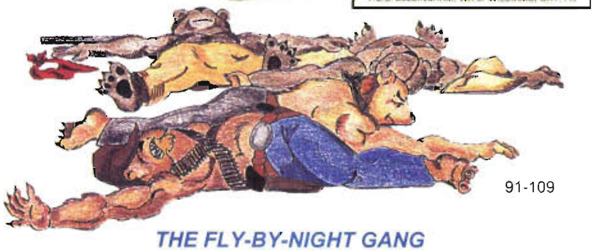

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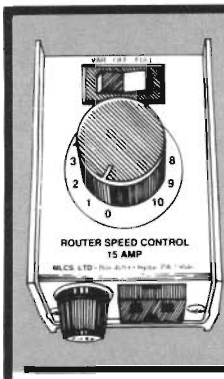

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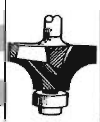
#350		⅛" **Round Over**	⅛" R	¾"	⅜"	¼"	$11.00
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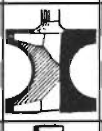
#460		¼" **Bull Nose**	¼" Dia. of Circle		⅜"	¼"	$14.00
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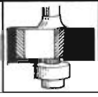
#366		⅛" **Slot Cutter**	⅜" Deep	1¼"	⅛"	¼"	$14.00
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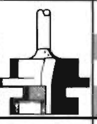
#221		½" Flush	Trimming	½"	1 3/16"	½"	$ 8.00
#545		**Tongue & Groove**	Straight	1⅝"	1"	¼"	$29.00
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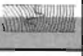
#546		Tongue & Groove	Wedge 	1 3/16"	1"	¼"	$29.00
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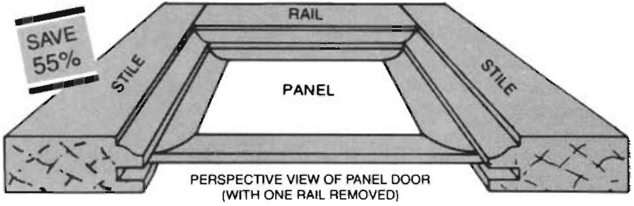

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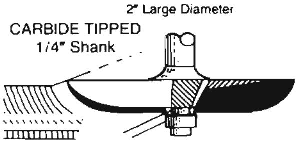

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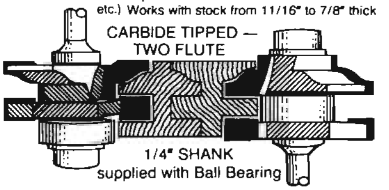

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On the Cover

Ken Sadler of Portland, Oregon uses a spokeshave to smooth the armrest for his spindle–back arm chair. This challenging project involves techniques such as bent lamination, and turning long thin spindles to make a handsome contemporary chair. One would make a nice desk chair, or build several for your dining room table. Ken tells you how, starting on page 66.

Phil Fischer

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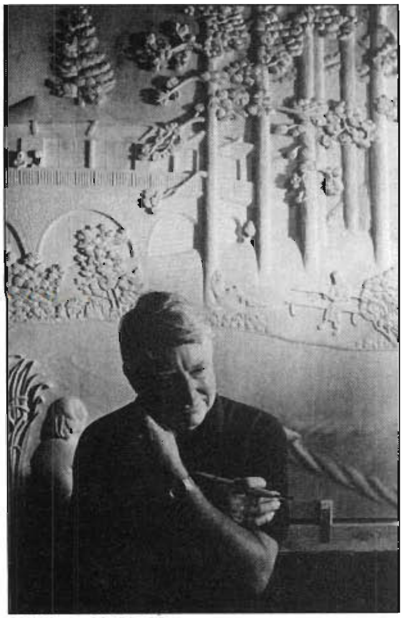
Clear Cuts

In May 1981, a guy by the name of Steve Aquilina published the first issue of a magazine called *Pacific Woodworker.* It was a sixteen–page, tabloid–size publication that was intended to reflect the interests of woodworkers of the West Coast. Since then, *PW* has changed ownership (and names) a couple of times to become the magazine you now hold in your hands. Along the way, we've added more and more pages, color, PullOut™ Plans, and we've changed our look and our editorial focus. Now, instead of concentrating on West Coast woodworkers, our purpose is to provide project ideas and technical information to woodworkers everywhere. I don't know if Steve would recognize this as the magazine he started ten years ago ...but I think he'd like it.

Long time readers of this magazine will be saddened to learn that William H. McMaster passed away on December 21, 1990. Bill's column *Focus on Carving* has been a regular feature in *PW* since Issue #15, October/November 1983. Over the years he taught us such things as sharpening and basic carving techniques, laminating carving blocks, clay modelling for woodcarvers, creating motion in sculpture, two–point perspective in relief carving and developing patterns from photographs. He also produced some excellent series of articles about carving in–the–round, relief carving, and on carving the human head, an Arabian stallion and carousel animals.


William H. McMaster with "The Columbia Panel"

Bill had an appreciation for all aspects of his craft, whether it was in the style of folk art as in the Northwest Coast Indian figures he wrote about in Issue #57, or caricature "whittling" (as he called it), but in most of his own work he strove to achieve realism. Much of his best writing was about how to accomplish this realism—or the "illusion" of it—particularly in relief carving where reality's third dimension must be expressed in a form that is more nearly two–dimensional.

In addition to his writing, Bill taught classes and seminars through the California Carver's Guild. His handouts to his students, his letterhead, and for a time, his articles in *PW* were always graced with his logo of a lone Scotsman playing the bagpipes—a symbol of his proud heritage. I know he was disappointed when I decided that it was an inappropriate graphic to publish in each issue. I present it now, with strains of "Amazing Grace" resounding in my head, as a fond tribute to a man who will be missed.

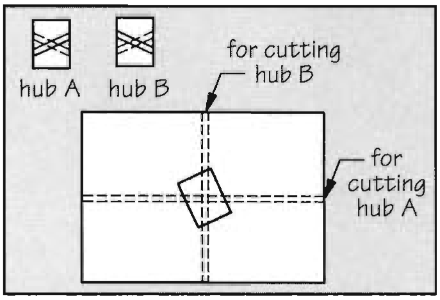
David M. Camp

Letters

We welcome your comments, pro or con, about articles we publish. Send your letters to: Editor, *Popular Woodworking,* 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.

Opposing Hubs

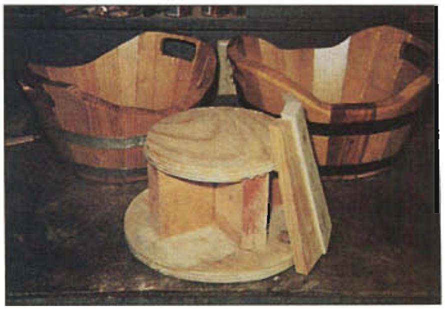
A comment on your "Roadrunner Whirligig" (PW #56, September 1990). The action of the whirligig is much more impressive if the propeller blades turn in opposite directions. To accomplish this, the hubs must have opposing slots. This is easily done with the same jig discussed in the article by using the miter gauge to cut the second hub at 90° to the first hub.



Carl J. Klamut, East Patchogue, NY

Bowling Assistance

In the November 1990 Issue, the article about making the coopered fruit bowl was very good, although the pieces are difficult to assemble. When I started the second one, I told myself there had to be a better way.



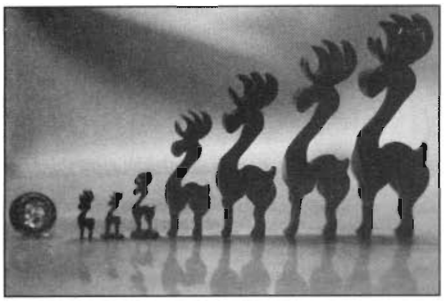
I started experimenting with different forms for holding the staves in place during assembly until I came up with the one shown in the photo above. The base circle is 10½" in diameter and the top is 8". The blocks in between amount to 5¾". You just set the staves against the form; when they're all in place its much easier to fit the hoops. If you want to make the bowl larger, just block up the form and cut longer staves. This will increase the diameter of the bowl.

A. F. Ramsay, Port Charlotte, FL

Smaller in Texas?

In *PW*#58 there was an article by Hugh Foster about scroll–sawn animals in which he described how to master compound cuts on the scroll saw.

In Texas we are sometimes known for always trying to make everything bigger, but we decided to take Mr. Foster's pattern of the reindeer and see how small we could make it. Enclosed is a picture of our reindeer placed beside a dime in order to emphasize the smallness of our finished product.



Roger Sell and Lyndel Evans,
Littlefield, TX

Nifty Gifty

Thank you for your November 1990 Issue—especially the "Scroll–Sawn Animal Figures" article.

Each year I've made some special wood items for gifts. This year I had not found anything that really appealed to me. I attended a Shopsmith® Sawdust Session and saw one of the reindeer that someone had left at the store; fortunately, another attendee knew where the plans were.

I guess I got a little carried away for I ended up making over five dozen in eight different sizes, from 3½" nose to tail to ¾" in pine, fir, redwood, mahogany, birch and red oak.

Thank you for this superb idea. At $4 each for those that I sold, I paid for a *Popular Woodworking* subscription in the first five minutes!

Arthur P. Chatham, Camarillo, CA

In the Bag

Let me start out by saying I enjoy *PW* very much. I look forward to each issue because there's always good info and projects. I've made quite a few of the projects and jigs and put the good info to use.

Now, regarding John Mulvihill's "Sandbag Clamps" tip in #58's *Tricks of the Trade* section, perhaps I can offer a suggestion in the way of refinement. I have used this type of clamp pressure for quite a number of years, but instead of just a cloth bag, I used three or four large loaf plastic bread bags stuffed inside each other to hold the sand and then put it in the cloth bag. This way the sand will not sift out through the cloth and perhaps ruin the project.

George S. Kenny, Goodrich, TX

Forest for All

After reading the January 1991 Issue (*PW*#58), I decided to write and comment on David Camp's editorial about forestry issues ("Clear Cuts," page 6).

I found it interesting and in good taste. Just thinking about what was said in the article made me think. If this problem of preserving nature and reproducing forest had crossed the minds of the timber industry 20 years ago, there probably wouldn't be many differences between industry and Greenpeace. There would be forest for nature's creatures and forest for industry. Then loggers would have jobs and spotted owls would have a place to live without having to be protected by laws.

Hopefully, businesses in this great country will look ahead to solve problems of product shortages, jobs and environmental conditions. This problem was created by greed for the highest possible profit now, without regard for the future of the timber industry or environment.

Industry and environmental groups should work together for a viable solution with concern for both problems; then Earth will have a future, meaning the people and creatures will have a future.

Ronnie D. Hays, Lakewood, OH

Timeless Update

In the time since I prepared the piece about Timeless Tools ("A Different Sort of Tool Store," PW #59) the shop has moved from Marquette, Michigan to Charleston, Illinois, as Rick Hartom has taken a position with the Illinois Community College System.

He continues to sell tools via his catalog, which is available for two dollars from Timeless Tools, Box 11, Charleston, IL 61920.

Hugh Foster, Manitowoc, WI

Correction

Once in a while we give complicated step–by–step instructions for cutting firewood, as in the case of Hugh Foster's CD storage unit in the last issue ("Building Compact Disk Storage Using Biscuit Joinery," *PW*#59). If you'd like to make a CD shelf that will actually go together and is big enough to put CD's in, use the corrected Cutting List and Figure 1 below. We regret the errors.

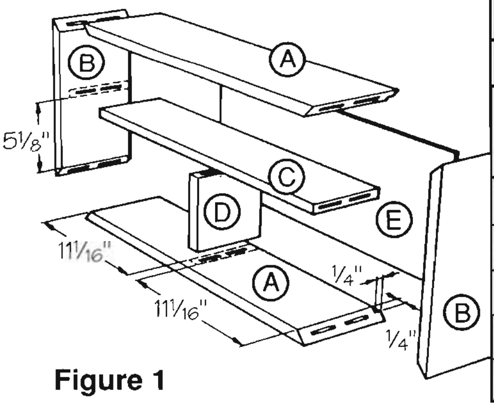


Figure 1

CD Storage Unit

***Corrected* Cutting List**

		Finished Size			
Qty	**Part**	**T**	**W**	**L**	**Piece**
2	A	⅝"	6"	24"	top & bottom
2	B	⅝"	6"	12⅛"	ends
1	C	⅝"	5"	22¾"	shelf
1	D	⅝"	5"	5⅛"	partition
1	E	¼"	11⅝"	23¼"	back

Tricks of the Trade

"Tricks of the Trade" shares readers' tips for making woodworking tasks easier and safer. If you've come up with a trick that would help other woodworkers, send it to "Tricks of the Trade," c/o* Popular Woodworking, *1320 Galaxy Way, Concord, CA 94520. Include any photos or sketches that help illustrate your idea (we'll redraw them). We pay $25 for each trick we publish.

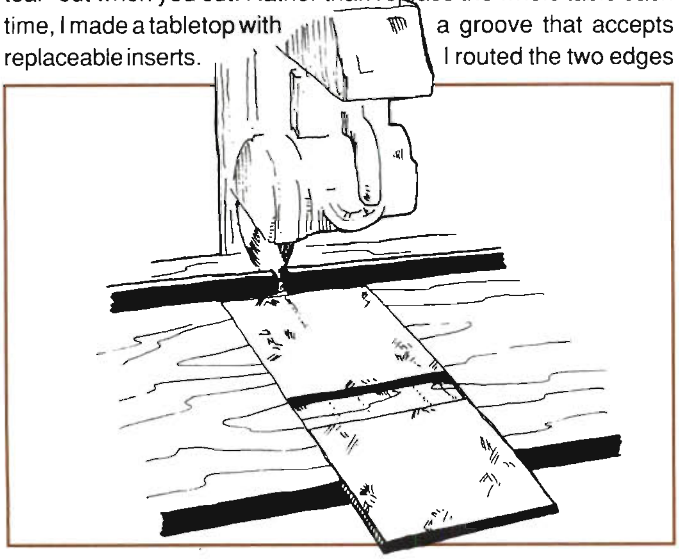
Identifying Cutoffs

Whenever you're cutting stock to length, measure the cutoff and mark its length (rounded down to the nearest inch) on the end before putting it back in the lumber rack. This not only helps you quickly find an appropriate piece, but also identifies an end that you can be sure is trimmed square.

Dave Newell
Benicia, California

Radial Saw Table Insert

As the groove below the blade in your radial arm saw table gets wider and deeper, it's a good idea to replace the surface to reduce tear–out when you cut. Rather than replace the whole table each time, I made a tabletop with a groove that accepts replaceable inserts. I routed the two edges of a $\frac{3}{8}$" deep X 4" wide groove with a 14° dovetail bit. I removed the rest of the waste with dado blades on the table saw. Then I made a supply of inserts out of $\frac{3}{8}$" MDF and routed their edges with the same dovetail bit. It's easier to slide two short inserts into the groove than it is to slide in a full–length one.



Richard Steussy
Novato, CA

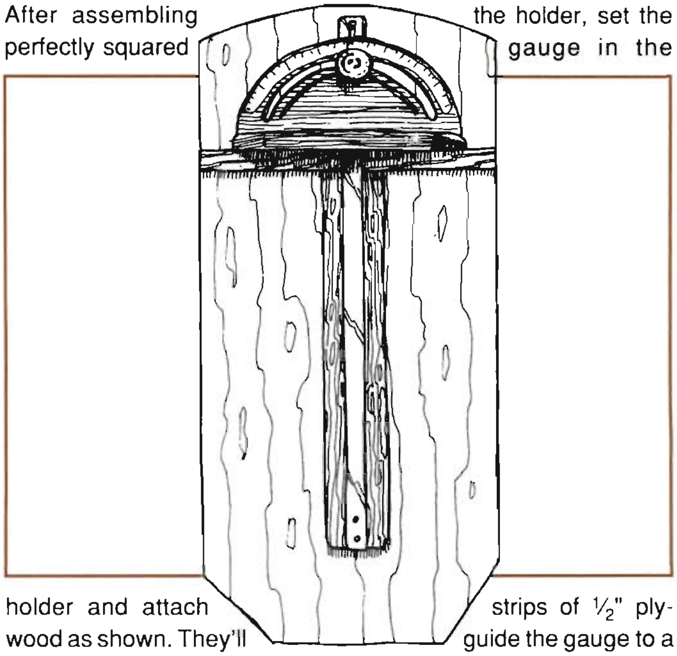
Bug Off!

If you like to finish projects outdoors, you've probably encountered the problem of small insects landing on and sticking to freshly coated surfaces. Next time, try lighting a citronella candle five minutes before you start. Let it burn throughout the drying time. Citronella candles repel all sorts of flying insects, and are available at most hardware stores.

Tim Muzic
Fountain Valley, CA

Miter Gauge Holder

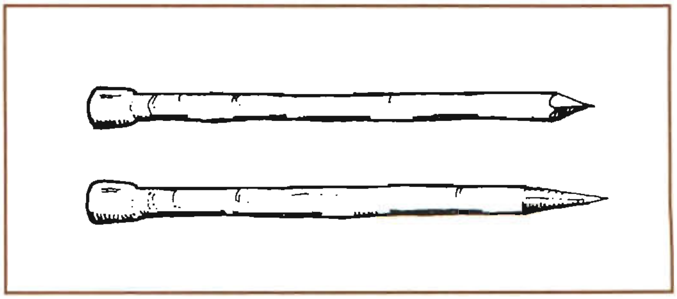
You can make a holder for your miter gauge that will hang on the wall conveniently near your table or band saw and provide a means for quickly squaring up the gauge or adjusting it to commonly used angles. A piece of $\frac{3}{4}$" plywood works fine for the back; the strips supporting the gauge need to be $\frac{3}{4}$" hardwood. After assembling the holder, set the perfectly squared gauge in the holder and attach strips of $\frac{1}{2}$" plywood as shown. They'll guide the gauge to a perfect 90° every time. Use a drafting triangle or the head of a combination square placed on the holder to set it to 45°. If you need to set it to an odd angle regularly, simply cut a block to replace the triangle.



Randy Carter
Eden Prairie, Minnesota

Needle Nail

The manufactured point on nails of all sizes is wedge–shaped on four sides. This point works fine in carpentry, but for cabinetry and close work, the wedge–shaped point will move to a grain line, thereby moving the work slightly out of line. To make the nail enter the wood precisely where you place it, grind a needle point on the nail. An easy way to do this is to chuck the nail in a hand drill and touch the point to the edge of a rotating grind stone.



Devore O. Burch
Fort Worth, Texas

Dar Chyi

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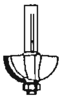
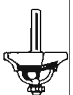
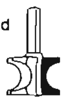
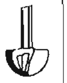
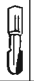
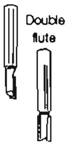
Item No.	Shk Dia.	Diagram	Radius	Cutting		Price
				Dia.	Len.	
T100B	1/4	Round Over	1/8	3/4	5/16	10.00
T101B	1/4		3/16	7/8	3/8	11.00
T102B	1/4		1/4	1	7/16	11.00
T103B	1/4		5/16	1-1/8	1/2	12.00
T104B	1/4		3/8	1-1/4	5/8	14.00
T105B	1/4		1/2	1-1/2	3/4	16.00
T107B	1/2		1/4	1	7/16	13.00
T110B	1/2		1/2	1-1/2	3/4	16.00
T111B	1/2		5/8	1-3/4	7/8	19.00
T112B	1/2		3/4	2	1	20.00
T113B	1/2		1	2-1/2	1-1/4	32.00
T115B	1/2		1-1/4	3	1-1/2	41.00
T200B	1/4	Beading	1/8	3/4	5/16	10.00
T201B	1/4		3/16	7/8	3/8	11.00
T202B	1/4		1/4	1	7/16	11.00
T203B	1/4		5/16	1-1/8	1/2	12.00
T204B	1/4		3/8	1-1/4	5/8	14.00
T205B	1/4		1/2	1-1/2	3/4	16.00
T207B	1/2		1/4	1	7/16	13.00
T210B	1/2		1/2	1-1/2	3/4	16.00
T211B	1/2		5/8	1-3/4	7/8	19.00
T212B	1/2		3/4	2	1-1/4	20.00
T213B	1/2		1	2-1/2	1-1/4	32.00
T301B	1/4	Roman Ogee	5/32	1-1/8	15/32	15.00
T302B	1/4		1/4	1-1/2	21/32	16.00
T303B	1/2		5/32	1-1/8	15/32	15.00
T304B	1/2		1/4	1-1/2	21/32	16.00
T901B	1/4	Cove 	1/4	1	3/8	11.00
T902B	1/4		3/8	1-1/4	1/2	12.00
T903B	1/4		1/2	1-1/2	5/8	13.00
T904B	1/2		1/4	1	3/8	11.50
T905B	1/2		3/8	1-1/4	1/2	12.50
T906B	1/2		1/2	1-1/2	5/8	13.50

Item No.	Shk Dia.	Diagram	Radius	Cutting		Price
				Dia.	Len.	
T2501B	1/4	Cove Beading	3/16	1	1/2	12.00
T2502B	1/4		1/4	1-1/8	9/16	13.00
T2503B	1/4		5/16	1-1/4	5/8	14.00
T2506B	1/2		1/4	1-1/8	5/8	13.50
T2508B	1/2		3/8	1-3/8	9/16	17.50
T2509B	1/2		1/2	1-5/8	5/8	19.50
TC8B	1/4	Classical 	1/8	1-1/8	1/2	18.00
TC8B	1/2		1/8	1-1/8	1/2	18.00
TC12B	1/4		3/16	1-3/8	11/16	18.00
TC12B	1/2		3/16	1-3/8	11/16	18.00
TC16B	1/4		1/4	1-5/8	13/16	19.00
TC16B	1/2		1/4	1-5/8	13/16	19.00
T7506B	1/4	Ogee	1/8	1-1/8	1/2	16.00
T7506B	1/2		1/8	1-1/8	1/2	17.00
T7508B	1/4		3/16	1-3/8	5/8	16.00
T7508B	1/2		3/16	1-3/8	5/8	17.00
T1602	1/4	Dovetail	14°	1/2	1/2	5.50
T1604	1/2		7°	3/4	3/4	6.50
T1606	1/2		14°	1	7/8	7.50
T1607	1/2		14°	1/2	1/2	6.00
T401B	1/4	45° Chamfer		1	3/8	11.00
T402B	1/4			1-3/16	1/2	12.00
T403B	1/4,1/2			1-3/8	5/8	12.00
T404B	1/2			1-5/8	3/4	15.00
T406B	1/2			1-7/8	1	17.00
T801	1/4	Half Round 		15/16	1/4	13.00
T802	1/4			1-1/16	3/8	14.00
T803	1/4			1-3/16	1/2	15.00
T805	1/4,1/2			1-7/16	3/4	16.00
T806	1/2			1-9/16	7/8	16.00
T807	1/2			1-11/16	1	18.00
T2601	1/4	Keyhole (Carbide Tipped)		1/4	3/16	7.50

Item No.	Shk Dia.	Diagram	Cutting		Price
			Dia.	Len.	
T601	1/4	Core Box 	1/4	1/4	9.00
T602	1/4		3/8	3/8	10.00
T603	1/4		1/2	3/8	12.00
T604	1/4		5/8	5/8	13.00
T605	1/2		3/4	5/8	14.00
T607	1/2		1	3/4	17.00
T701	1/4	V Groove	3/8	1/2	8.00
T702	1/4		1/2	1/2	9.00
T704	1/2		3/4	5/8	11.00
T706	1/2		1	3/4	12.00
T1501B	1/4	Slot Cutter	1-1/4	1/8	13.00
T1503B	1/4		1-1/4	1/4	13.00
T1506B	1/4	Rabbet	1-1/4	1/2	11.00
T1512B	1/2		1-1/4	1/2	11.00
T1903	1/4	Round Nose 	1/4	5/16	9.00
T1905	1/4		1/2	5/8	12.00
T1911	1/2		3/4	1-1/4	16.00
T1912	1/2		1	1-1/4	18.00
T2001B	1/4	Flush Trim	3/8	1/2	7.00
T2003B	1/4		1/2	1/4	7.00
T2004B	1/4		1/2	1	7.50
T2005B	1/4		1/2	1-1/4	8.50
T2008B	1/2		1/2	1	8.00
T2101	1/4	Mortising	1/2	13/32	8.00
T2102	1/4		5/8	9/16	9.00
T2103	1/4		3/4	3/4	10.00
T2209d	1/4	Straight Single flute  Double flute	1/2	1	8.00
T2211d	1/4		5/8	3/4	8.50
T2212d	1/4		3/4	3/4	7.50
T2214d	1/4		1	3/4	9.00
T2301s	1/2		1/4	3/4	7.00
T2303s	1/2		3/8	1	8.00
T2310d	1/2		3/8	1-1/2	10.00
T2313d	1/2		1/2	1-1/4	10.00
T2315d	1/2		1/2	2	13.00
T2318d	1/2		3/4	1-1/4	10.00
T2320d	1/2		1	1-1/4	11.00
TGS100	1/4	Straight/ Wedge	1-5/8	1	29.00
TGS100	1/2		1-5/8	1	29.00
TGW100	1/4		1-5/8	1	29.00
TGW100	1/2		1-5/8	1	29.00

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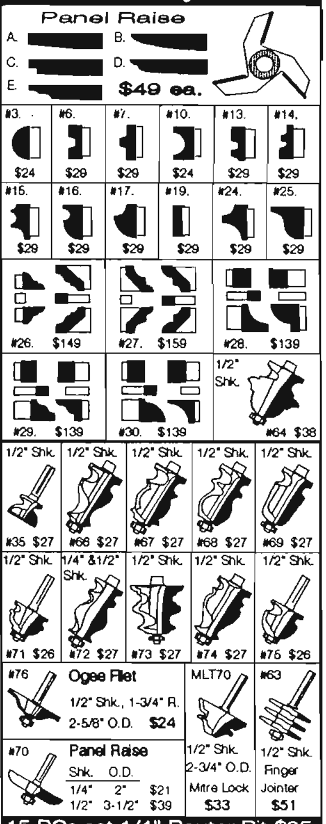

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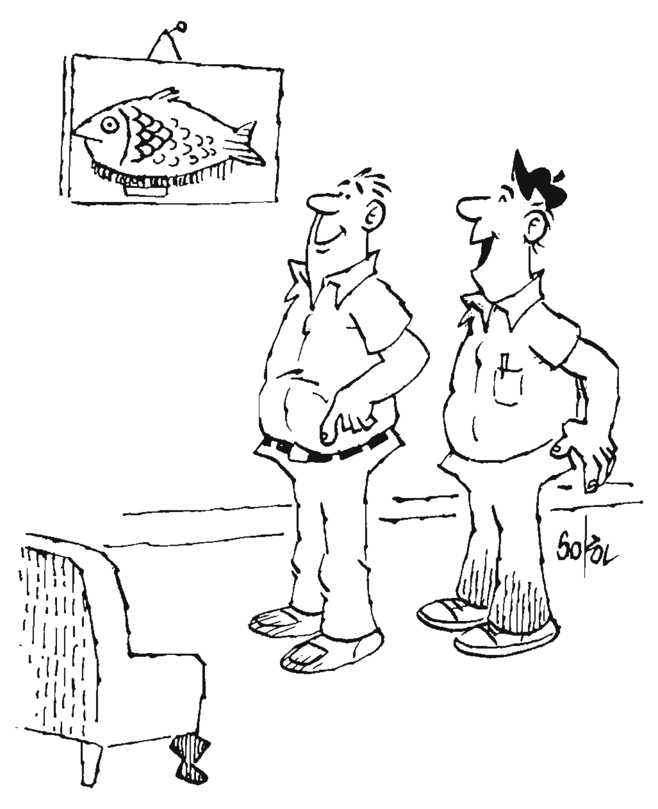

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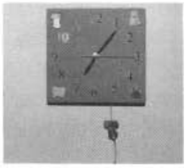

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#10914 1-3/4", 1/4" hole 11.50/100
#11016 2", 1/4" hole 8.00/50
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#11020 2-1/2", 3/8" hole 6.50/20
#11022 2-3/4", 3/8" hole 7.50/20
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#12004 11/32" AP4 .... 1.50/20

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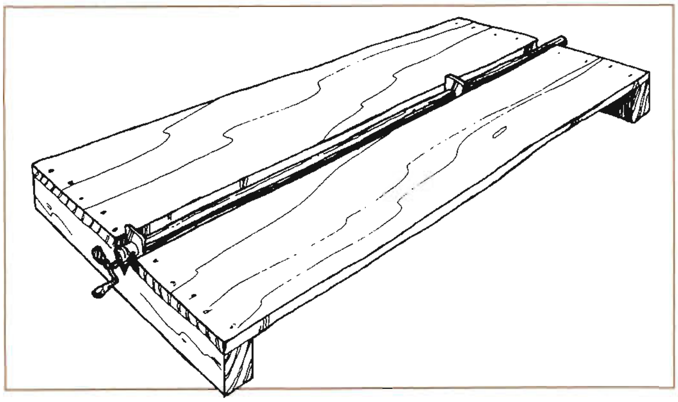
Sanding Clamp

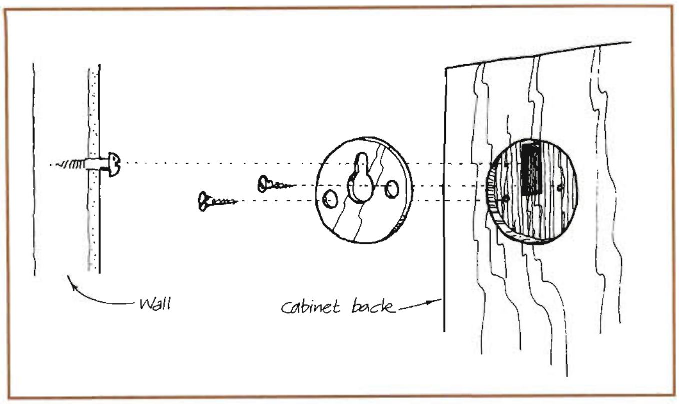
I made a useful clamp for holding boards during sanding from two 4' lengths of 2 X 12. Nail them together with a 2 X 4 positioned at each end, leaving about a 2" gap between the 2 X 12's. Cut V–shaped grooves in the 2 X 4's; you can then lay a ¾" pipe clamp in the gap, resting in the V's. Set this up on your saw horses and you have an easy way to secure any size board.



John Schuttenhofer
Earl Park, IN

Wall Hanging System

Hanging small cabinets and other woodworking projects can be a problem. One solution is to rout or chisel out a circle the size and depth of a large flat washer on the back of the item to be hung. Drill the washer as shown so it can be screwed securely into the mortise, and file a key slot from the center hole. Before screwing in the washer, rout or chisel out a second smaller area within the mortise deep enough to accept the head of the hanger screw. With the hanger screw fastened to the wall, you can slip its head *through the* hole in the washer and into the key slot. For heavier loads, try a fender washer.



Howard V. French
Abilene, Texas

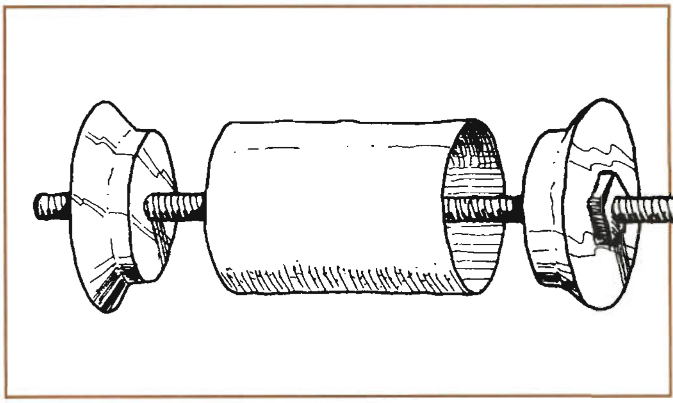
Car Mat Bench Pad

No matter how carefully you sweep your bench surface, sooner or later you'll scratch the underside of a workpiece whose top surface your sanding, especially if you're working with a soft wood like pine. Pieces of wood and other gritty particles find their way under, leaving big gashes that must be sanded away and little scratches that you don't notice until you've applied stain. Many automobile floor mats have little rubber or vinyl projections covering their undersides every ¼" or so. These points keep the work from sliding while you sand, plus any material, including grit, falls harmlessly between them.

James A. Johnson
Brunswick, Ohio

Sanding Drum Arbor

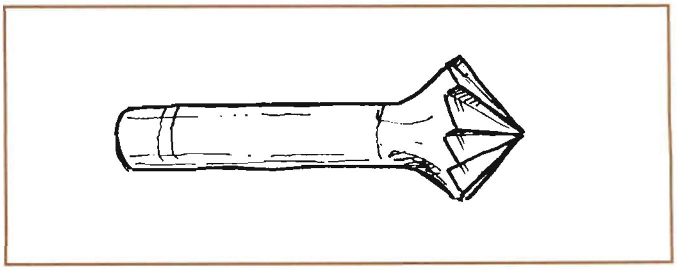
If you need to use a small sanding drum, but don't have an arbor to mount it on, you can make one with the help of a drill press circle cutter. Set the radius of the circle cutter slightly larger than the radius of the sanding drum and cut two pieces out of ⅜" thick stock. Take the center pieces (the ones usually thrown away) and sandwich the sanding drum between them. Run a ¼" bolt through the assembly to hold it together and to provide a shank to go in the drill press chuck.



Dan Labzentis
Endicott, NY

Substitute Router Bit

Most good cutters operate at 25,000 to 30,000 rpms. With a two–blade cutter, that's about 60,000 cuts per minute. A rosebud countersink made of hardened tool steel (used in metalworking) has several more cutting edges. When router–mounted, it provides 150,000 cuts per minute, and is great for veining work and sign–making.



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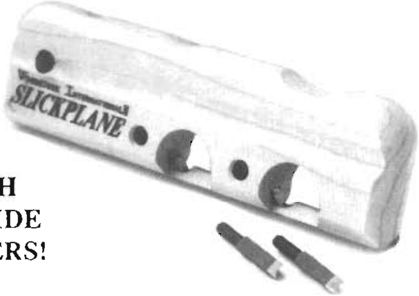

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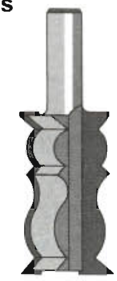
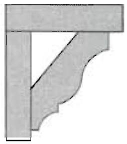


1/2" SHANK

PART	CUTTER DIAMETER A	CUTTING LENGTH B	OVERALL LENGTH C	PRICE
C1522	1-1/8"	1-1/2"	3"	$\$30^{00}$
C1521	1-1/8"	1-7/8"	3-3/8"	$\$35^{00}$
C1520	1-3/16"	2-1/4"	3-3/4"	$\$39^{00}$



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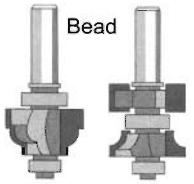
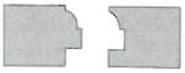


C1550 C1551

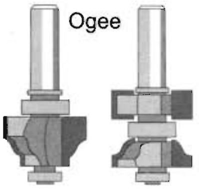
1/2" SHANK

PART	CUTTER DIAMETER A	CUTTING LENGTH B	OVERALL LENGTH C	PRICE
C1550	1-1/2"	1-5/8"	3-1/4"	$\$49^{95}$
C1551	1-1/2"	7/8"	3-1/4"	$\$49^{95}$

2 - Piece Set **C1552** $\$95^{00}$



NEW



C1553 C1554

1/2" SHANK

PART	CUTTER DIAMETER A	CUTTING LENGTH B	OVERALL LENGTH C	PRICE
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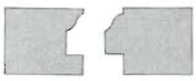
C1554	1-1/2"	7/8"	3-1/4"	$\$49^{95}$

2 - Piece Set **C1555** $\$95^{00}$



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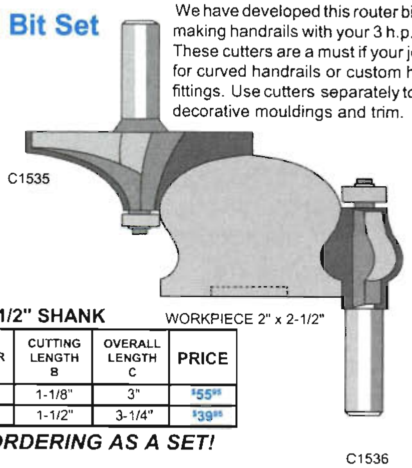

2 - Piece Set
C1542 $\$95^{00}$

1/2" SHANK

PART	CUTTER DIAMETER A	CUTTING LENGTH B	OVERALL LENGTH C	PRICE
C1535	3-1/8"	1-1/8"	3"	$\$55^{95}$
C1536	1-1/8"	1-1/2"	3-1/4"	$\$39^{95}$

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Videoscene

by Alan Marks

In a dusty corner of my office a small collection of videos has been accumulating for some time. They share two things in common: first, all have been produced in order to sell products. Secondly, I have neglected them all on purpose. It has not been particularly pleasurable for me in the past to review such tapes because the amount of useful information in them usually gets dwarfed by the sort of hype to be expected from parties with vested interests. The time has finally come to deal with them, and having dusted them off and popped them in the VCR, I can now share my findings with you.

Natural Wood Siding: Manufacturing, Selection, Installation, Finishing, ©1990 by the Western Wood Products Association and the Western Red Cedar Lumber Association, Yeon Building, 522 S.W. 5th Ave., Portland, OR 97204, 40 minute video and booklet, $20.

The least commercial of these videos was *Natural Wood Siding.* Anyone new to siding installation would be well advised to watch it before making any decisions. My own experience with siding is limited, but after having watched this video, I would certainly do some things differently in the future.

I would, for example, be fastidious about my prefinishing and backpriming to protect my investment over the years. Some of the shiplap redwood siding I installed fifteen years ago on the south side of my former shop, has cupped and split because I lacked some of the information mentioned in this tape, and I gave maintenance very little consideration.

It shocked me to find that oils provide only about two to three years of protection. This makes the "natural" look very costly in terms of maintenance. The galvanized finishing nails I used because I wanted my naiIheads discrete in appearance have rusted and streaked the wood, and, in many cases, have either popped loose from the studs or the siding has pulled away from them. The video drives home the point that finishing nails are not suitable.

In the video you will learn the terminology used for grading siding and how to choose siding widths based on pattern and moisture content. Some of the more common patterns are discussed and illustrated (shiplap, bevel, tongue and groove, channel lap) as well as types of surfaces (smooth, rough, saw textured)

Though this is all pertinent and useful information, this video almost totally neglects the actual installation of siding— things such as dealing with inside and outside corners, joints, cutting procedures, staggering of joints, proper tools, etc. Consequently there is room for another video on the subject, and as soon as one appears, I promise to review it for you.

TECO Deck Video, ©1987 by TECO, P.O. Box 203, Colliers WV 26035, $19.95, 20 minutes

The TECO company manufactures structural components such as nails and fasteners made of galvanized sheet metal (framing anchors and clips, joist hangers, step supports, post caps, and related hardware). Naturally the company would like you to use many of these in building your deck.

Besides the tape, the company supplies a brochure containing plans and instructions. Both can be ordered by dialing 800-GET-TECO.

Maybe a novice *could* actually build a deck using the video and the "Wood Deck Building Suggestions" brochure. Apparently many have done so. But I have my doubts that it was an easy task and a nagging suspicion exists that many a frustrated do-it-yourselfer may have regretted the undertaking. If we can believe what we are told, TECO receives 10,000 requests a week for these "suggestions."

In most areas, if you attach a deck to your home (as is most often the case) instead of building a detached one, you are required by code to place your posts on pier blocks instead of sinking them into the ground as shown in the tape. No mention is made of this.

Additionally, building code usually requires that balusters be spaced such that a 6" ball cannot pass between them. This keeps small children from getting their heads caught between them. The fact that TECO neglects such considerations appalls me. It surprises me that no disclaimer appears in the brochure, though I suppose if you are merely making "suggestions" you can't be held legally responsible for untoward results.

If you run into problems (as I anticipate) on your TECO deck project you need only call the convenient number mentioned above and a friendly representative promises to help you out. Trouble is, since 9,999 other people will be building their decks that very same week, many of them might well be calling at the same time you do.

To test this theory, I called the 800 number. I called on a Tuesday and got through immediately—so much for theories. The imaginary problem I faced the company with was as follows: "Armed only with the handsaw your brochure says I can use, I am trying to cut off the tops of the extra-long 4 X 4's you told me to stick in the ground. How do I get a square, level cut?"

It was recommended that I scribe a line on all four faces of the post using a square and that I cut grooves on all four faces. The saw blade would ride in the grooves as I cut, resulting in a square cut. Anyone who has attempted to cut off a fence post with a handsaw realizes how difficult it is to get a square cut and the method suggested doesn't make a lot of sense to me.

Most people would be building their decks on weekends. The TECO company doesn't offer this kind of assistance on weekends or holidays, so if you reach an impasse you'll either have to consult a knowledgeable local or wait until regular business hours on a weekday to get this kind of advice.

In my opinion, there is a real need for a good video on decks, and this one hardly qualifies.

The Stanley Workbench with Terrie Lee Hysell and Steve Borton, ©1990 by The Stanley Works, Advertising Services, Box 1800, New Britain, CT 06050, $14.95, 28 minutes.

This one begins with a grim disclaimer. No warranty is given and no results are

---

***Alan Marks** designs and makes furniture and cabinets in Carmel Valley, California, and is a Contributing Editor to* Popular Woodworking.

guaranteed. But don't give up yet; the outlook is hopeful.

The workbench depicted is a combination bench and pegboard back for hanging tools. A ledge strip on the back provides mounting holes for an impressive array of screwdrivers. Not designed for the professional woodworker, the bench is nonetheless ideal for the home handyman. It measures six feet long and 31" wide. A child-size version is also shown in the accompanying brochure which contains plans and detailed instructions. The brochure costs $1.00 and also features plans for a set of sawhorses.

The projects are designed for people with a basic knowledge of woodworking tools and techniques. They are explained and built by Terri Lee and Steve, who assist one another with pleasant smiles and appreciative commentary, much the same as we receive from our mates in our own home workshops. Right?

All lumber used is standard in dimension and is available at any lumberyard. First, the video offers some general tips on using tools, and then we get down to brass tacks. It would be hard to make a serious mistake on the workbench because everything is so well illustrated.

The sawhorses included as plans in the brochure are also built in the video; they are as sturdy as could be wished for. They contain a lot of angles and are more sophisticated than the workbench. In making them, a tool called the Stanley Quick-Square® was used to lay out angles. This tool combines the features of a sliding bevel with a protractor, and though it doesn't entirely replace the former, it looks like something you might want to add to your tools because it eliminates steps in many carpentry applications.

Instruction is clear throughout. I appreciated the relative absence of hard sell during the construction sequences and I feel that the tape and brochure together do a good job of presenting the projects. Plans are well presented and I recommend the tape without reservation. PW

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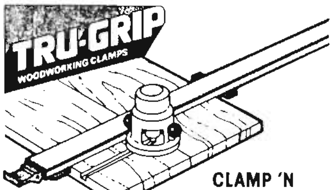

CLAMP 'N TOOL GUIDE

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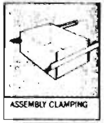
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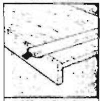
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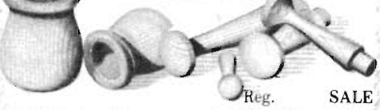

	Reg.	SALE
3-1/2" Shaker Peg	$15.00 / 100	$11.00
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1-1/2" Toy Wheel	$10.00 / 100	$ 7.00
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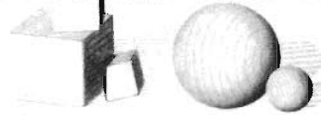
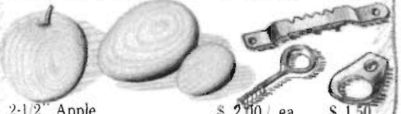
Axle Pegs for Above	$ 5.00 / 100	$ 3.00
1-1/2" Birch Spindle	$10.00 / 100	$ 7.00
12" Ramin Spindle	$12.50 / 25	$10.00
3/8" or 1/2" Birch Button	$ 2.00 / 100	$ 1.25



1/2" Square Block	$ 8.00 / 100	$ 6.00
3/4" Square Block	$10.00 / 100	$ 8.00
1" Square Block	$12.00 / 100	$10.00
3/4" Full Round Ball	$ 9.00 / 100	$ 5.00
1" Full Round Ball	$12.00 / 100	$ 7.50
1-1/2" Full Round Ball	$ 4.00 / 10	$ 2.00
2" Full Round Ball	$10.00 / 10	$ 5.00
2-1/2" Full Round Ball	$20.00 / 10	$10.00
3" Full Round Ball	$ 3.00 / EA	$ 1.80



2-1/2" Apple	$ 2.00 / ea.	$ 1.50
5/8" x 7/8" Wren Egg	$10.00 / 100	$ 8.00
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1-1/4" x 3/8" Heart	$ 8.25 / 100	$ 7.00
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1/2" Round Bead	$ 3.50 / 100	$ 2.50
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by Ken Sadler

Sell It By Mail

The phrase "mail order" is used to cover at least three major methods of selling, however, only two of them—catalog and direct sales—truly fit the name. Both of these methods entail placing ads in magazines and newspapers. The third consists of preparing printed sales literature which is then mailed to addresses on a list, usually purchased from a company that compiles them. The proper name of this last method is "direct mail." In my opinion, it is not at all suited for small operations. It is very expensive because you have to mail to a very large list to get sufficient orders to make any money.

Almost any wood product that can be shipped without too much cost can be sold by mail. Forty years ago, I operated a company that made prefabricated wood greenhouses and sold them by mail, as did several other companies. There are now about a dozen outfits in this field alone. Furniture of all kinds, from kits to completely finished pieces are being sold by a number of companies. I know of small operators who are selling fancy boxes, desk accessories, toys, bathroom accessories, bird houses and feeders and many other items all made of wood. The latter are all semi–production items. Furniture, however, falls into both the semi–production and custom built categories.

Who are the people that are successfully selling these things by mail? In furniture here are but a few. In the custom built category, you'll find Thomas Moser in New Gloucester, Maine and Charles Webb in Cambridge, Massachusetts; in semi–production there is Shaker Workshops out of Concord, Massachusetts and Yield House in North Conway, New Hampshire. I've known of Yield House for fifty years. They started as a very small operation selling kits for about a dozen different pieces of furniture, exclusively by mail. Today they have an elaborate 50–page color catalog, with well over a hundred different pieces in all conditions from kits to completely finished, as well as many small accessories, still all by mail. Then there is the Little Hickory Furniture Co. from Marion, Indiana that sells children's rockers and other such pieces handcrafted of hickory sapling trees and rattan.

As to the smaller semi–production items, if you'll look through the gift catalogs which regularly inundate you, you'll find all the items I have mentioned and more. You may say that these are stores rather than producers, but if the stores can sell them by mail, so can you. And don't overlook the fact that you can sell by mail to the stores as easily as to the customers; in fact, stores are better because they become repeat customers.

Selling by mail has distinct advantages for the small operator. He can get access to a national market at a minimum cost, it will eliminate the distribution problems a small business has in selling through normal retail channels, and it brings in the full retail price. Furthermore, if you make a product that requires creative selling, you won't get it into today's retail stores, but you can sell it directly through mail order.

Mail order is not cheap. It used to be the least expensive method, but with the increases in postal rates, advertising rates, and printing costs, those days are long gone. It is, however, still a very cost–effective way of selling if it's done right, and it is certainly cheaper than having sales people on your payroll or paying a big commission to a manufacturer's representative.

There are a couple of additional considerations that apply to any type of selling by mail. You must be prepared to answer every inquiry within 24 hours, either by shipping the goods ordered or by acknowledging the order and stating when you will ship. This is essential in developing customer confidence for the future, without which your mail order sales will not prosper. Being able to do this requires keeping a reasonable inventory of all of the items you're offering for sale (obviously this does not apply if your product is custom furniture). Another consideration is the financial one: how much money can you spend getting this program off the ground? In the beginning the cost per order will have little relation to true cost–effectiveness. Ads take time to develop their potential, and after people have received your catalog, they procrastinate before sending in an order. It may take a year to get the average cost per order to a level you can live with.

The Catalog Route

The technique most used today consists of placing ads in various magazines with the intent of persuading people to write for a free catalog. A precondition for this approach is to have more than one item to sell. The more items in your catalog, the better chance you have of making a sale each time you send one out. More people will write for a free catalog than will buy any particular item. What you're really after here is the names and addresses of people who are interested in what you have to sell. This will build a mailing list that you can send your catalog to at regular intervals again and again. In fact, once you have built a large enough mailing list, you can cut back drastically on your magazine advertising.

To start the process, buy copies of the magazines that cater to the kind of people that will be interested in your product. Contact each magazine, either by mail or by phone, and ask for their advertising rate schedule as well as their circulation and its geographical distribution. With a magazine that has several sections, such as *Better Homes & Gardens*, ask for a breakdown of circulation by reader interest. When you have received this information you will need to sit down and analyze it at length. Determine which magazines will give you the best coverage of the market you're trying to reach for the least cost. You will also need to decide whether you can do the job with one ad for all magazines, or whether you need two or three different

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***Ken Sadler** is a retired furnituremaker in Portland, Oregon.*

ads, and how big they should be. This is going to be, in large measure, determined by cost. This analysis will also tell you whether you can afford to get involved at all.

Look at overall circulation, look at the geographic breakdown of that circulation, and look at the breakdown of readers based on their interests. What you're looking for will depend on what you're selling. For example, suppose you are selling a product for gardeners. A magazine like *Sunset* has several departments of which gardening is one. You will want to know how many of its readers are interested in gardening since the rest of its readers will not be interested in your product. At the same time look at a magazine like *Horticulture* which is exclusively gardening. Compare its total circulation with the number of *Sunset* readers interested in gardening and then compare the rates of the two magazines to estimate the cost per interested reader. In a situation like this, you can often afford a larger ad in the specialty magazine and still get a lower cost per interested reader.

Having figured out, at least tentatively, the magazines in which you're going to advertise and the size of the ads you're going to buy, you can go ahead and design the ads. The smaller the ad, the more important its design. If a small ad is jammed with copy, it is very apt to be overlooked. The eyes of people paging through a magazine are caught by something that stands out, not by a lot of copy that blends in with the rest of the page. Be brief and to the point. Don't waste space on a picture unless it's attention–getting or very pertinent to the ad. Try to place a code in each ad that will tell you not only what magazine the reply came from, but which issue of that magazine. This code is usually placed somewhere in the address.

Don't be surprised or discouraged if the first ad doesn't bring a flood of requests. By the third ad in any publication you should have enough answers to pay for all three ads. If you don't, either your ad doesn't pull or the magazine doesn't work for you. You have to figure out which.

The most important item in the process is your catalog. A catalog can be anything from two pages to over a hundred pages—whatever it takes to properly present the various items you're offering for sale. Keep in mind that this is your only sales contact with your potential customer. If the catalog doesn't make the sale, it won't be made. It doesn't have to be fancy, it doesn't have to be on slick paper, and it doesn't have to be in color. What is important is what you say and how you say it. The old saying, "a picture is worth a thousand words," is very much to the point here. It's a good idea to have a separate order blank and price list, then you can change your prices without reprinting the catalog.

Once the ads are placed and the requests begin coming in, you should begin tracking the results. Construct two charts, one that shows response to the ads by magazine and by issue of that magazine, and one which shows how many requests for catalogs are converted into orders. The first chart is important for two reasons: it shows you how well a magazine is pulling, and it shows you when the results from any given magazine begin to fall off, so that you can pull the ad and move to another magazine. The second chart is an indication of how good your catalog is, or beyond that, how much the buyers like your products. Keeping these charts may seem like a lot of tedious work, but without them you will not know what is happening, and you may spend a great deal of money with poor or mediocre results.

The Direct Sales Route

The second mail order technique is based on the marketing of a single item with the idea of selling as many as possible as fast as possible. This technique is only effective with certain kinds of products. They should be either impulse items or items that take advantage of a fad or a popular trend. For the most part, they should sell for less than $25 so that people won't think about the price if they want the item.

Depending on the type of item, you should place ads in either Sunday newspapers or specialty magazines. The ads should be large enough to be easily noticed, prominently display the item, and include an order coupon. They should also be coded for identification and state an unequivocal money back guarantee. Remember, this ad is your only salesperson; if it doesn't make the sale, there is no sale. A good size for newspapers is 2 columns wide by 3" long. Check with your local paper, they will explain how to prepare ads for newspaper publication.

In placing these ads, the best and least costly place to start is the Sunday newspapers. Start with your local paper and see what kind of results you get. When advertising to other parts of the country, you are faced with the same considerations as in the previous method: to whom does your item appeal, where do they live, and what type of people are they? This latter will determine where in the paper you want the ad to go. If the papers show considerable success, then you can think about specialty magazines.

There is a risk in this method that is not usually present when working with a catalog type plan: the item can take off on you. I know of one instance where a small company went from nothing to sales of 4000 units a day in a period of six months. It doesn't happen often but if it does, the whole thing can boomerang, especially from a financial standpoint. It takes a lot of money in a hurry to finance such rapid growth. Don't let this intimidate you, just make you cautious. Be sure, if the signs begin to appear, that you know where you can go for the necessary money.

Tracking the ads is even more important in this method. Things move faster here and an ad can run out on you before you know it. This can cause you to spend a lot of money on ads that have lost their effectiveness. As the sales grow you will expand your advertising coverage. The company in the example above was, at the height of their campaign, in 75 newspapers every Sunday. To keep this from getting out of hand takes careful tracking. Since this is a direct sale ad, the reply is the sale and conversion is not a factor, so you need only the one chart.

There are the two major methods of selling by mail. I hope I have given you enough information so you will have some understanding of them and perhaps be persuaded to give one of them a try. PW

Tried and True

by Graham Blackburn

Sharp Teeth Bite Best

Table saws, circular saws, chop saws, and band saws have become so common that many people are genuinely surprised to learn that quality work can be performed with a simple hand saw. When people learn that I regularly use hand saws in my shop, some go away muttering things like "purist fanatic" and "living in the past." Certainly it would be foolish to deny oneself the benefits of modern machinery, but often the appropriate hand saw is a very reasonable alternative and sometimes a distinct advantage—when you have the right saw and the skill to use it.

At first glance one hand saw may look very much like another, but trying to rip with a crosscut saw can be frustrating. Using a saw in good condition is equally important. Simply buying a new saw doesn't guarantee it will work well. Many things not readily apparent affect a saw's fitness for work, including the shape, set, number and size of its teeth, as well as the quality of the materials from which the saw is made. Furthermore, a beginner can have as much trouble with a well-conditioned saw as with one in poor shape—and blame it all on the tool, not realizing that the job requires a different type of saw. For more about hand saws, see "Good Old Handsaws" in *Popular Woodworking* # 37.

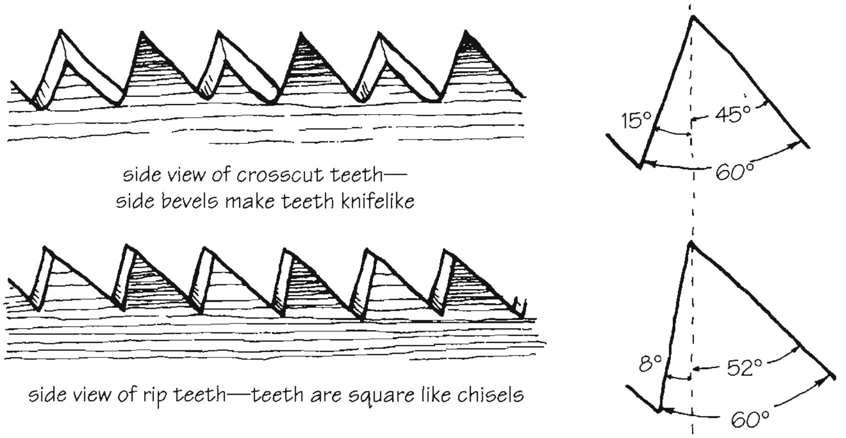

side view of crosscut teeth—
side bevels make teeth knifelike
15°
45°
60°
side view of rip teeth—teeth are square like chisels
8°
52°
60°

Figure 1. Crosscut and Rip Teeth

The Differences Between Saws

When I use the term **hand saw** I'm referring to the wide-blade, single-handled saws now sold as rip and crosscut hand saws. It's hard to buy a new hand saw that is anything else, but still turning up in secondhand shops, fleamarkets, and auctions are many other types of wide-blade hand saws—ship saws, gauge saws, pruning saws, joiner's saws, and plumber's saws. All are true hand saws because they average two feet in length, have a wide blade and a single handle. It's important to realize that the term hand saw does not mean simply any saw used by hand rather than by power; many other types of saws used by hand are not referred to as hand saws, including coping saws, fretsaws, keyhole saws, and compass saws.

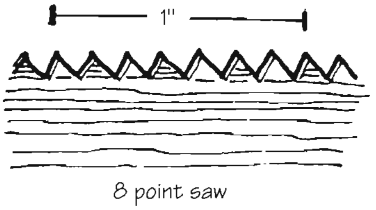


Figure 2. Point Size

Knowing whether a saw is designed to crosscut or rip is essential, since practically every time you put saw to wood you are almost always doing one or the other. Figure 1 illustrates the difference between teeth designed to crosscut and those designed to rip. Notice the different angles of the teeth profiles, and the fact that crosscut teeth are beveled so they'll cut like a series of knives while rip teeth cut only at their tips like a series of chisels. Guessing at a glance whether a saw is designed to crosscut or rip by looking at the size of the teeth alone can be deceptive; both sorts are made with different numbers of teeth to the inch—a feature usually identified as point size. Calculate the point size by counting the number of teeth in a linear inch, as shown in Figure 2. Ripsaws generally have fewer points than crosscut saws, but a 10–point rip saw can have teeth the same size as a 10–point crosscut saw, so judging the saw type by the teeth size alone is by no means a sure method.

Although the cut of the teeth is the most important distinction between saws, the rest of the saw's design can also vary. Length is the most obvious difference, ranging from ten inches to three feet. The width of the blade at the handle end (the **heel**) and at its tip (the **toe**) may also vary considerably. Its shape can differ greatly, depending on its use and how it's made, as well as on a variety of novelty "improvements" like those designed to turn the saw into a measuring device or to make its depth of cut self–regulating. Finally, the handle can take a variety of shapes, positions and means of attachment. All the above features affect how a saw works and how it should be used.

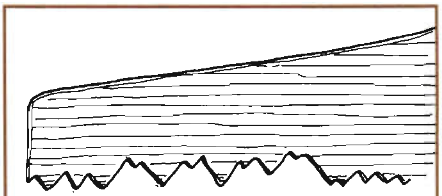


Figure 3.
Badly Shaped Teeth

***Graham Blackburn** is a furniture designer and maker in Rio del Mar, California, and author of many books on woodworking and home maintenance including* A Home for All Seasons.

Teeth

A newly bought saw should at the least have evenly formed teeth. With use (and abuse) and frequent sharpenings, the regularity of the teeth may be lost, possibly ending up as *bad* as those illustrated in Figure 3. A saw with teeth like this should be recut by a professional, but you can correct moderate unevenness in the course of regular sharpening. However, evenly formed teeth are no guarantee of correct shape or adequate sharpness. Knowing what to do requires a little study, but the actual sharpening is easier than sawing itself—it's certainly cheaper than sending them out, and you are guaranteed a quicker and (with a little practice) as good a job.

Jointing

Assuming a saw's teeth are all fairly uniform in size and shape, the first step in any sharpening is to joint the saw. Using a factory-made hand saw jointer or a simple user–made device (Figure 4), run a mill file lightly along the top of the teeth until a small land is formed on the top of *every* tooth. You may have to squint to see the light reflected from the flat part you've filed, but it's important to produce such a land on all the teeth. Of course, the more uneven the teeth are, the greater will be the disparity between the size of lands on individual teeth. If it's too great, don't make all the teeth the same height the first time, but joint only the highest, then shape and sharpen them, and then joint the teeth a second time. Be careful when jointing to keep the file perpendicular to the blade; don't let it tip from side to side—this is the chief purpose of a hand saw jointer.

Shaping the Teeth

The next step should not be necessary with a new saw or even with an old saw that has been properly sharpened, but only when correction is necessary. Shaping the teeth is done to make sure that their fronts and backs are correctly angled and the gullets are all of equal depth. The process is simple and requires no more than filing at right-angles to the blade. Start by holding a small triangular file well down in the first gullet to form the proper angles of the fronts and backs of the teeth (see Figure 1). If the teeth are of unequal size, press more against the largest, filing until you reach the center of the land created by jointing. Continue along until all teeth are of equal size and all finish in a point.

It's not necessary now to worry about any bevel that crosscut teeth may require—be sure only to file at right-angles! The triangular file most useful for this operation has the cross–section of an equilateral triangle and sides forming angles of 60° (sometimes known as a "slim taper"), since the angle formed by the front and back of the saw's teeth is also 60°. Using a 60° file will guarantee this angle, but it is up to you to control the angle that the front (and the back) of the tooth makes with the perpendicular. This is the **angle of rake**. Those indicated in Figure 1 are all–purpose angles for rip and crosscut saws, but experienced sawyers may prefer slightly different angles according to the kind of wood being sawn and the angle at which they work. The effect of changing the rake is similar to the effect that different rakes have on bandsaw teeth. Many woodworkers are familiar with specifying rake when ordering bandsaw blades; you can achieve the same thing when shaping hand saw teeth.

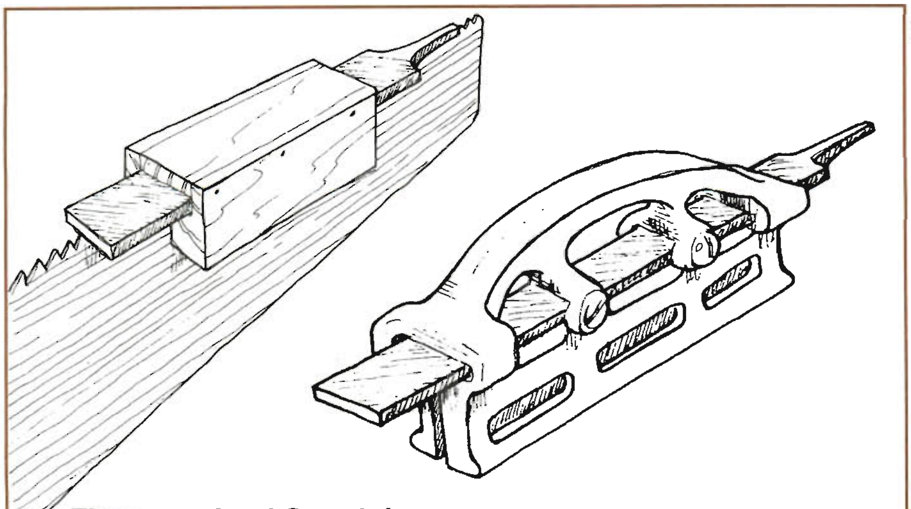


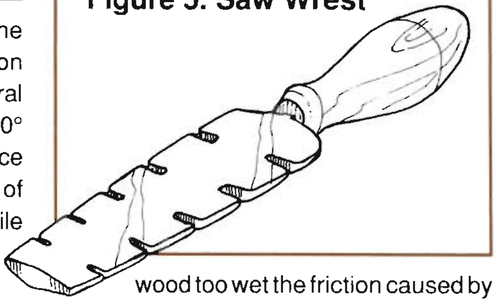
Figure 4. Hand Saw Jointers

author

Setting the Teeth

Setting is the process of bending no more than half the height of a tooth to one side, then bending the next tooth similarly to the opposite side. When all teeth are set, the kerf made by the saw will be wider than the thickness of the saw blade by the amount you've bent the teeth. This provides positive clearance for the blade and prevents binding. If the set is too little or the wood too wet the friction caused by sawing can cause the wood to swell and bind the saw. Consequently, how much set is appropriate is a function of the wood you're sawing. Crosscutting dry hardwood requires less set than ripping unseasoned softwood. For this reason the well–equipped shop will contain several crosscut and rip saws with different sets.

Figure 5. Saw Wrest



Although the process of setting used to be accomplished with a simple tool called a saw wrest (Figure 5), patented saw sets now available are easier to use since many contain "anvils" *adjustable to the point size* of the saw being set, thereby providing a preset, albeit only average, amount of set. The perfectionist will prefer the saw wrest since any amount and degree of set can be achieved at will. As with shaping, setting should not be necessary every time the

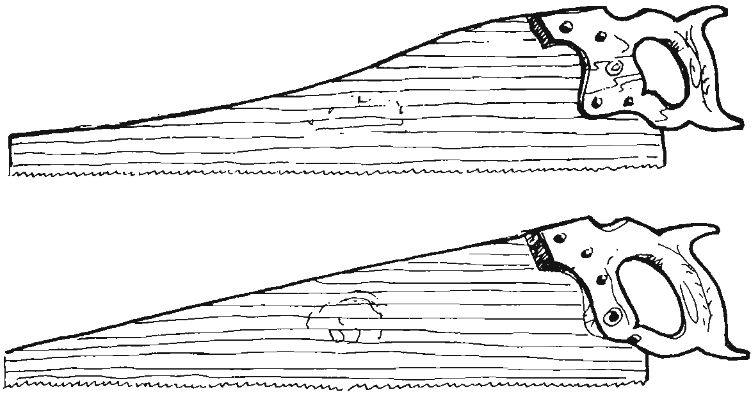


Figure 6. Skew–Back and Straight–Back Saws

Sharpening and Jointing	
point size	**file**
4-1/2 to 6 points	7" slim taper
7-8 points	6" slim taper
9-10 points	5"-6" slim taper
11-15 points	4½" slim taper
16 points & over	5" superfine metal saw
for jointing	8"-10" mill bastard (smaller to fit factory–made jointer)

saw is sharpened. Experience will be your guide as you become more sensitive to small changes in set and how they affect the sawing of different kinds of wood. However, be aware that a taper–ground saw, by virtue of the fact that its blade becomes progressively thinner from the teeth to the back, requires very little set.

How do you identify a taper–ground saw?A new saw it will undoubtedly have been advertised as such. Older, better quality saws, made when pride of manufacture resulted in ornate inscriptions often still discernable if you clean the blade well enough, will bear a message to the effect. Among really old saws, those with skew backs (Figure 6) are more likely to be taper–ground than straight–backs, but simply measuring the thickness of the blade at the gullet and at its back is the easiest way to tell taper–ground from flat–ground.

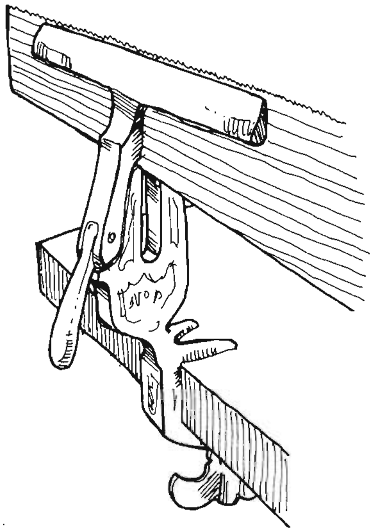


Figure 7. Saw Vise

Sharpening

Whether sharpening rip or crosscut teeth, you need some form of saw vise or clamp (Figure 7) to hold the saw firmly just below the level of the gullets, or it will chatter and scream when you try to file it, and the file will quickly become dulled. The only other requirement is the correct size file as indicated in the chart above.

Both kinds of saws should be given a light jointing pass with a file, just enough to produce the tiniest land. Work in a good light so you can see this tiny shiny area, then proceed as follows.

Crosscut and Rip Filing

Fix the crosscut saw in the vice and stand at position one, as shown in Figure 8. Starting at the toe of the blade, pick out the first tooth that is set *towards* you. Place the file in the gullet to the *left* of this tooth, holding the file level with the floor and angled to the saw as shown. Make sure

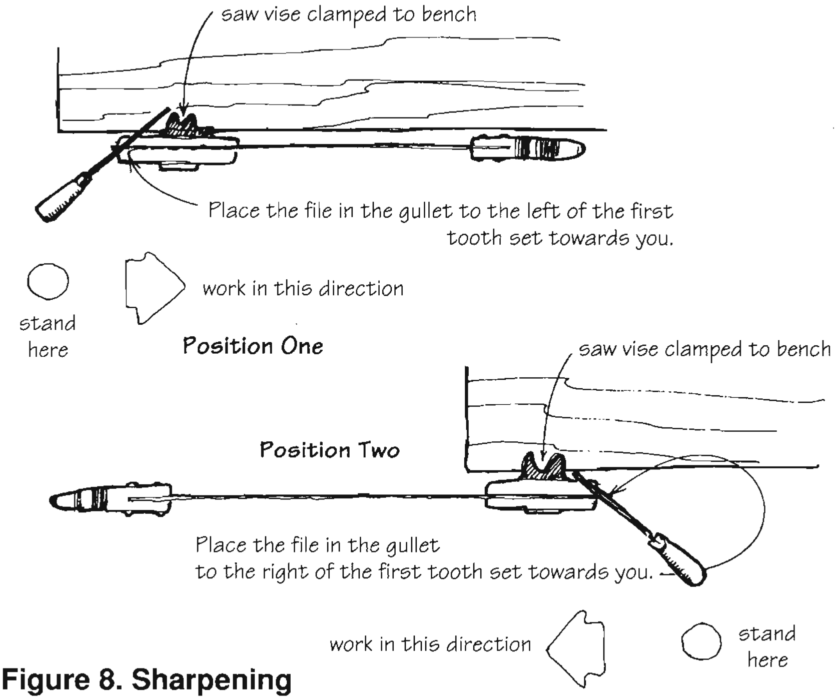

saw vise clamped to bench
Place the file in the gullet to the left of the first tooth set towards you.
stand here
work in this direction
Position One
saw vise clamped to bench
Position Two
Place the file in the gullet to the right of the first tooth set towards you.
work in this direction
stand here

Figure 8. Sharpening

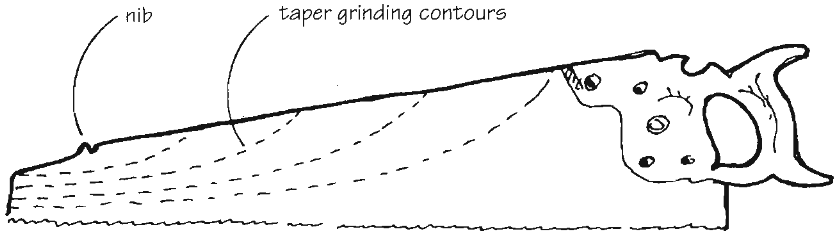


Figure 9. Old Taper–Ground Saw with Nib

that the file sets down well into the gullet. Check constantly that you keep the file horizontal and notice that the angle at which the file should be held to the saw corresponds to the angle of the bevels cut on the edges of the teeth. If this is not easy to see, try looking at the teeth nearest the handle. They're generally used less and retain their factory grind longer. Try letting the file find its own bearing against these bevels to get the feel of where the correct angle should be. File gently until you have worn away *half* the land formed on the tip of the teeth. This shouldn't take more than a stroke or two.

Now lift the file out of the first gullet, skip the next gullet (to the left of the next tooth which is set to the right), and place it in the third gullet (to the left of the next tooth set towards you). File as before, and repeat the process all the way down the blade.

When you reach the heel of the blade, reposition the saw in the vise, and yourself and the file, as shown in position two (Figure 8). Now place the file in the gullet to the *right* of the first tooth set towards you. This should be the first gullet you skipped when filing from position one and will be obvious if the saw is used or old since the filed gullets will now all be shiny. When you have filed away the remaining half of the land on the top of every tooth, the saw will be sharp.

If all the teeth are at the same height (check this by sighting along the tips—a slight crown along this line is preferred by some woodworkers), the angle of rake is consistent and appropriate to the work in hand, the bevels exact, and the set sufficient, then the teeth are ready to cut.

File rip saws the same as crosscut saws, but work the file straight across the saw, at right angles to the blade. As Figure 1 shows, rip saw teeth must have no side bevel. However, don't be tempted into thinking it would be quicker to start at one end and file *every* tooth. It's true that there are no alternating bevels and you should file straight across, but in practice this is hard to do perfectly, and a rip saw filed this way is likely to "lead" or favor one side. By filing first all the teeth leaning towards you, then reversing the saw and your position and filing the remaining teeth, any slight inaccuracy in filing is equalized and the saw will run straight.

Blade and Handle

Before starting to saw, however, check the condition of the blade and the handle. Aside from the obvious need for a blade free of rust or grease, a blade with kinks and raised scratches will not help the saw's operation. Scratches can be filed or steel–wooled away, but serious kinks must be hammered out. Since this is a process of redistributing the metal, it's usually best to leave it to a professional.

Old saws frequently have a small nib on their back at the toe end (Figure 9). Thought to be a vestige of the original curved shape of the first wide–blade hand saws made by the Dutch towards the end of the seventeenth century, this nib is useful for sighting along the blade when sawing—but not for cutting nails, as many oldtimers maintain! If it has broken off, forget about it.

With the introduction of the new wide blades, English sawmakers developed a completely new method whereby the handle is slotted and fitted over the end of the blade, instead of being bored to receive a tang formed in the blade like the old pistol–grip style. Blade and handle are then riveted or screwed together (Figure 10). Present day handles, especially cheaper plastic models, often display only a vague resemblance to the beautiful and extremely comfortable shapes first designed this way. Even if, in the name of economy or contemporary design sensibility, you disregard the elegant curves and cutouts (intended to lighten the handle), or the intricate carving (designed to provide a more secure grip), or the way in which the bottom part of the grip was often carved to give the appearance of the handle having been folded into place while in an

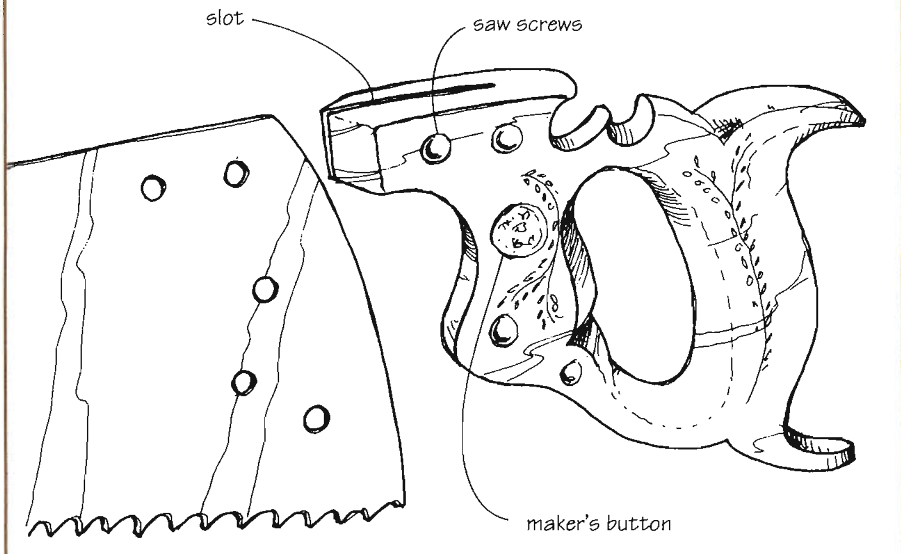


Figure 10. Handling the Blade

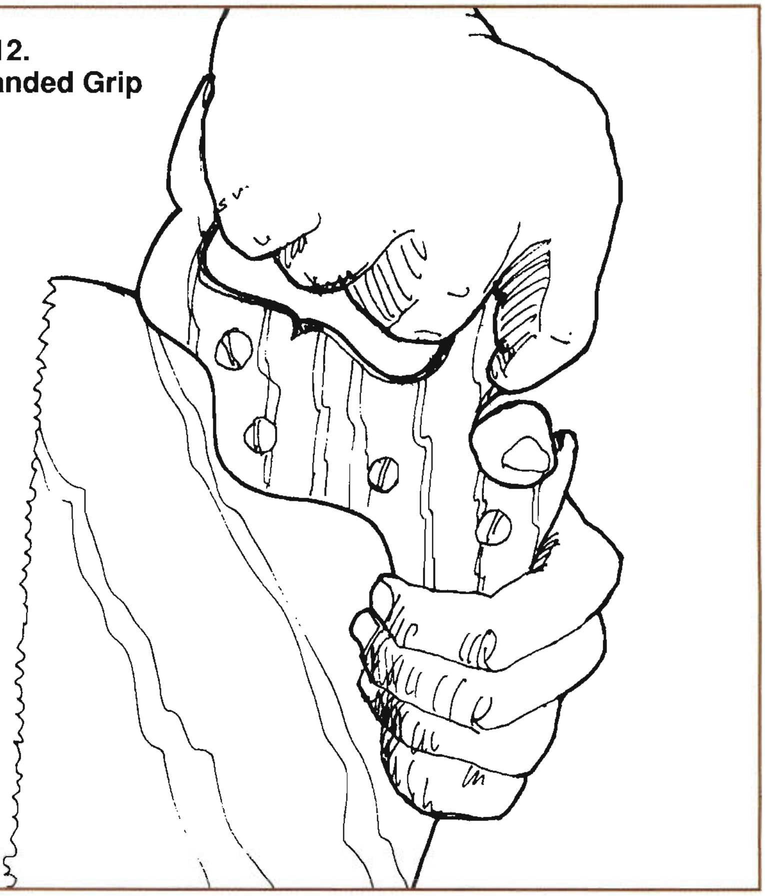
author

almost fluid state, it is hard to deny the superior comfort afforded by an old handle. The better the saw, the more screws were used to affix the handle—a five-screw handle (including one being the maker's button) marks the top of the line. Keep these screws tight (file a screwdriver as shown in Figure 11 for this purpose), since a loose handle dissipates the effort intended for the blade and decreases your control over the saw.

Models and Techniques

Apart from using a crosscut saw for crosscutting and a rip saw for rip sawing, there are other factors that can influence the efficiency of your hand sawing. Although it used to be common practice to re–cut and use broken saws, good balance is vital to a saw's ease of use. Balance is affected by the overall length, the shape and weight of the blade, and the design and positioning of the handle. Naturally a larger saw will make heavy work easier, and there's little point in wielding a 26" heavyweight where an 18" panel saw will suffice, but you should use the saw that feels most comfortable for you.

Figure 12. Two–Handed Grip



Some prefer the streamlined lighter weight of skew–backs (Figure 6); others the greater rigidity of straight–backs (also made in lighter versions). But probably most critical is choosing a saw with the appropriate number of points for the job. The choice is simple: fewer points result in faster cutting, more points produce finer work and a smoother cut. To rip 8⁄4 hardwood, a 5–point, straight–back rip saw is very efficient; using such a saw to crosscut 6" of ½" pine would be like removing a tiny splinter with a pickaxe.

Having chosen the right saw, the mode of operation can make a big difference. For ripping heavy timber the kneeling position is best—one knee on the work, and the blade at 60° to the surface of the wood. For lighter ripping it's often more comfortable to stand upright, secure the work above sawhorse height, and use the overhand method. Some saws even have handles designed to be held this way (Figure 12 and *Popular Woodworking* #37, p. 15).

Never force or press the saw; properly sharpened it will cut very well on its own. All you have to do is guide it. If it seems difficult to keep to a straight line, you may be pushing too hard and forcing the teeth to follow the path of least resistance (up soft grain) before they have a chance to cut their way. If the set of the teeth is biased towards one side or the other, the saw will tend to curve towards the side with the greater set. Either reset the teeth or try running a file lightly down the side of those teeth whose set is greatest.

Avoid all jigs and tips purporting to help you hold the saw exactly perpendicular—you'll never develop a reliable eye if you become addicted to such crutches. Position yourself as exactly over the line to be cut as possible and try to maintain equal visibility of both sides of the blade.

No matter how carefully you saw, some wood is cantankerous. It will twist and flex and the kerf will close up behind the saw, binding the blade tighter than a vise. Use softwood wedges (not screwdrivers) to keep the kerf open. Saw slowly and gently; it's easy if you're doing it correctly.

Next to planing, sawing should be one of the great pleasures of woodworking. It allows you to discover the true nature of your material safely—and with all the wonderful tactile and aromatic subtleties usually drowned in the roar and showering dust of a five horsepower motor.

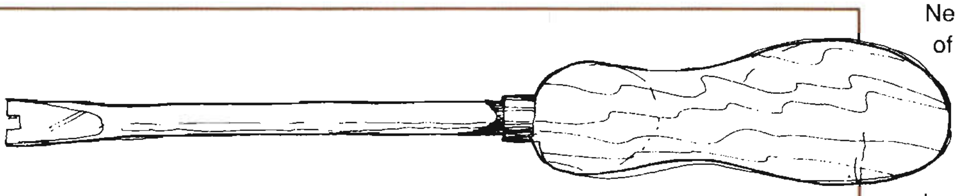


Figure 11. Screwdriver Adapted for Saw Screws

Book Reviews

by Hugh Foster

Woodworking with Your Kids by Richard Starr (The Taunton Press, 63 South Main St., Box 5506, Newtown, CT 06470-5506) 206 pages, paperback, $14.95

The cover advises that *Woodworking with Your Kids* contains "over 30 projects for all ages." While this is indeed true enough, it misses one of the essential points about the book: The woodworking projects presented here give kids something to do that they'll positively love doing —if we present it to them as well as Starr obviously presents it to his kids, and that is the book's main value.

The woodworking techniques shown here are all safe, designed to make competent as well as happy woodworkers. Starr is teaching his kids classic hand woodworking techniques rather than power tool wood–butchery. Their hand tool experience is sure to make them better users of power tools.

Kids who are shown the kind of attention and affection that is evident in Starr's classroom won't have the kind of troubles that get negative newspaper attention. School systems (and parents) everywhere should adopt programs like Starr's (not just in woodworking) to show kids that adults care that they make something of their spare time, and of themselves.

Woodworking: Techniques, Tips & Shortcuts from a Master Craftsman by B. William Bigelow. (TAB Books, Blue Ridge Summit, PA 17294-0214) 228 pp., paperback, $16.95

B. William Bigelow has been a contributor to *Popular Woodworking* far longer than I have. His clear presentation of interesting ideas continues in this volume as he takes us through 25 intermediate projects, each of which illustrates a specific technique. The projects teach us new tricks on the table saw, band saw, router, drill press, lathe, and other common shop tools.

Bigelow's book is sure to get extended hands–on use in my shop—and it should in yours, too.

Carousel Horse Carving: An Instruction Workbook by Ken Hughes, ©1987 (Heritage Arts Press, 3315 Sacramento St., San Francisco, CA 94118) 139 pp., spiral bound, $25.00

This extremely specialized, self–published book contains nothing but a single project, a one–third size carousel horse reproduction. The blank is made from solid wood rather than hollow–body lamination. The author takes us step–by–step from concept through finishing, and then shares several pages of photos illustrating other ways of creating carousel horses. With the book's large fold–out plan and the author's patient instructions, even a novice carver should be able to create a credible piece of equine statuary while improving carving skills in the process. The book is pretty much only available by ordering from the publisher directly.

Carving Carousel Animals: From 1/8 Scale to Full Size by H. LeRoy Marlow, ©1989 (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810) 192 pp., oversized paperback, $18.95

This is a handsomer, less expensive and more easily available book than the work reviewed above. Marlow sketches rather than details the process, and picks up where the other leaves off. He describes about 31 projects well enough that a careful worker (who doesn't expect a carousel figure to be finished in a weekend!) can competently build a horse, tiger, goat, stork, mule and other figures originally designed 60 to 100 years ago for leading carousel manufacturers. I especially like the frog. Not for the novice, to be sure, but most of us are expert watchers, and the variety, quality and nostalgia are a treat. **PW**

Hugh Foster is a part–time furniture designer/builder in Manitowoc, Wisconsin and the author of The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016.*

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Chain Saw Carving

by James C. Walin

Some woodcarvers don't use chisels and gouges; some, like Dennis Roghair, of Hinckley, Minnesota, sculpt wood with a chain saw. According to the 1987 World Champion Chain Saw Carver, "The business potential for talented chain saw artists today is enormous. Working seasonally, the best artists can earn up to $8,500 per month selling pieces, doing custom jobs, doing promotions for chain saw manufacturers and carving demonstrations, and competing for contest prize money.

Chain Saw artistry can be a dangerous craft; it is only as safe as the person operating the saw. Dennis suggests that it shouldn't even be attempted unless you have at least 25 cumulative

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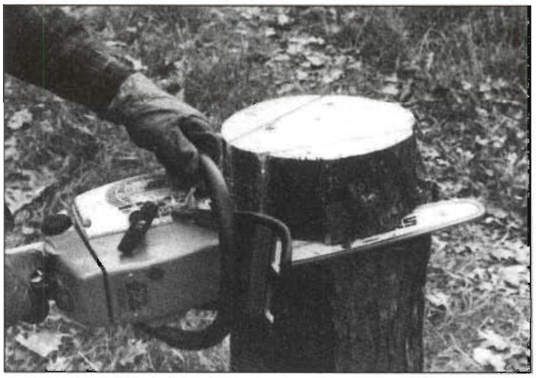
***James C. Walin** is a freelance writer in St. Paul, Minnesota.*

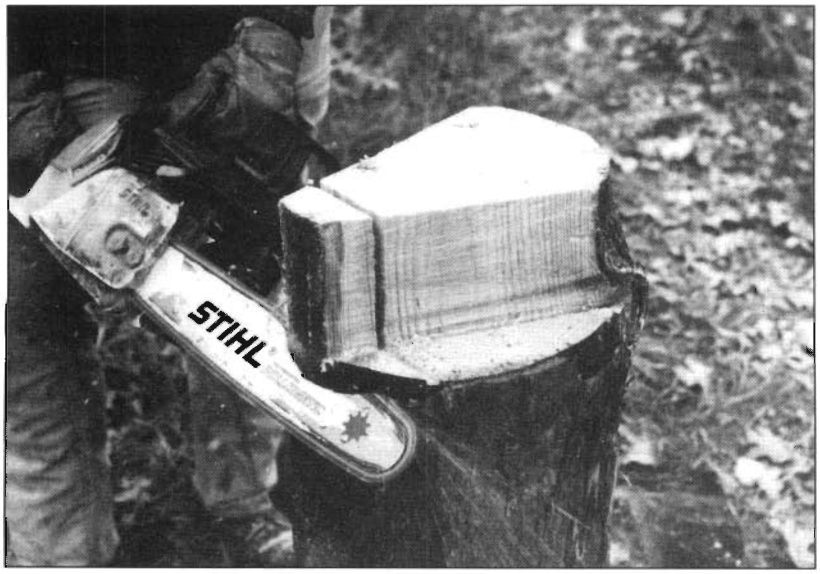
Getting a Bear Out of a Log

Cut a 12"-30" diameter log to 3'-4' long (but no more than you and a helper can lift), and square off the ends at 90° to the sides of the trunk. Dig a 12" deep hole, balance the piece on end, then firmly pack the dirt back in around it.

1



Make two downward cuts in a shallow "V" pattern, with the narrowest portion nearest yourself, but don't make the cuts cross each other. (On a 12" log, make them about 8-9" deep—proportionally deeper on a bigger log.) Now cut in from the side, parallel to the top, and remove the slab side pieces left by your first cuts. Be careful not to overcut the pieces.



2

On the narrow end of your "V", make a straight downward cut several inches in from the bark at the same depth as your cuts in Step 1. Follow this with a 45° angled cut upward to meet the bottom of your last cut. (If you don't get it right, carefully run the moving chain up and down this cut until the two cuts line up.) Next, with an angled downward cut, chamfer off the back of the piece to the same height as you did on the front angled cut.

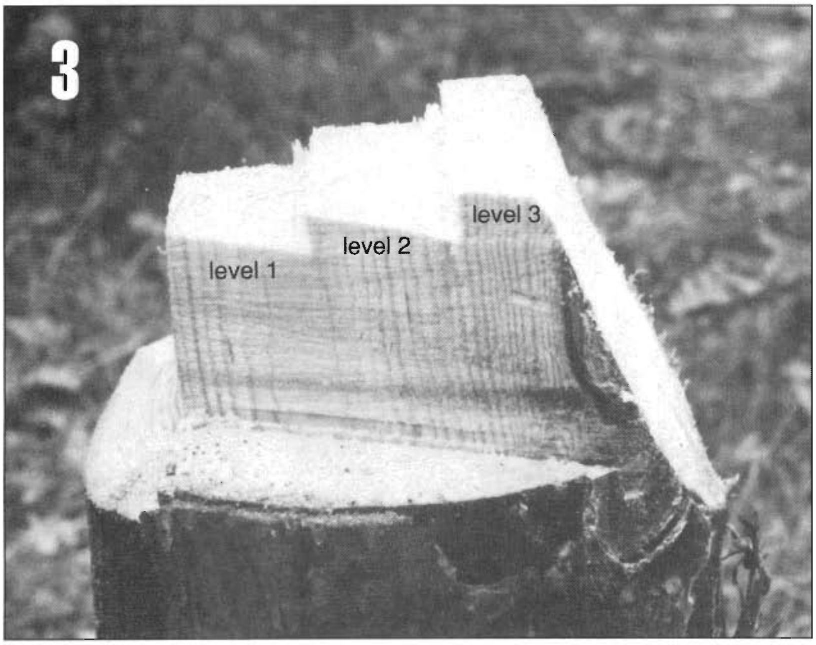
hours of chain saw operating time just cutting wood.

A carver's chain saw must have the following features: 1) motor displacement of less than 4 CID (cubic inch displacement) on gas saws. Anything over 4 CID is too powerful for beginners; 2) a stock bar length as sold from the factory (at least 12" long on electrics); 3) a chain brake to automatically stop the chain in case of kickback. This is critical to safe sculpting since most of the carving is done with the bar tip—the primary kickback zone.

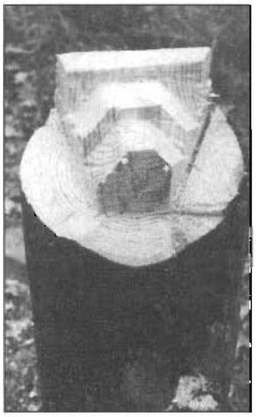
A lightweight, well–balanced saw is best (the small 2-3 CID saws are ideal for beginners), but the craftsman's patience and attention to detail are far more important.

If you don't already own it, you'll need some safety gear which you should wear for regular sawing, too. It's absolutely essential that you wear safety pants or chaps which are nylon–impregnated and can stop a moving chain by stalling the saw. You'll also need ear protection, leather boots or professional logging boots, preferably with steel toes, and safety goggles—even if you wear eye glasses.

You'll also want to maintain a safety stance—make sure the saw bar tip always points *down* and *away* from your body and never carve with the tip above your waist height. And never carve alone; be sure there's someone nearby in case of emergency.



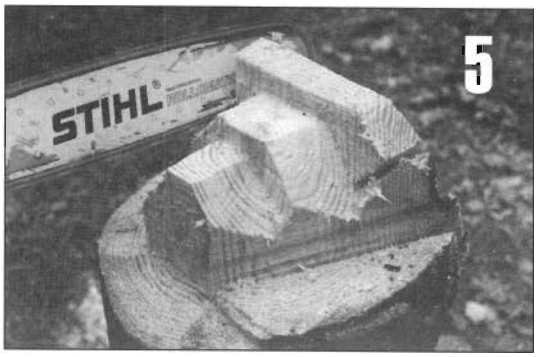
Visually divide the remaining portion of the log top into thirds from front to back, and cut down vertically about 3" at the first point, then only about 1 1/2" at the second point. Now, with cuts parallel to the top, remove the pieces so that they form "levels" up to the rear. Call the lowest cut level 1, the next one up level 2, and the tallest one level 3.

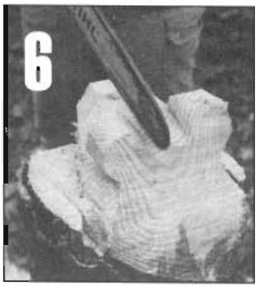


4

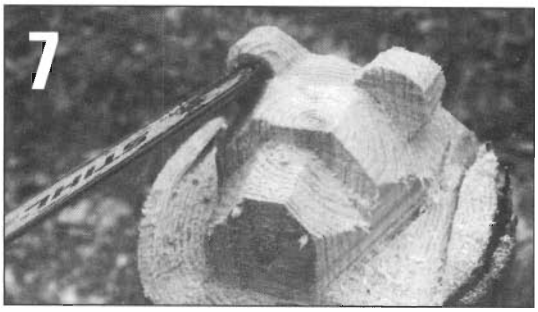
Now, proportionally cut the corners of the levels off at 45's, cutting back to the solid wood on each level.

On level 3, make a 45° cut from the bottom of your angle cut into the depth of level 2, then remove the material flush with level 2.

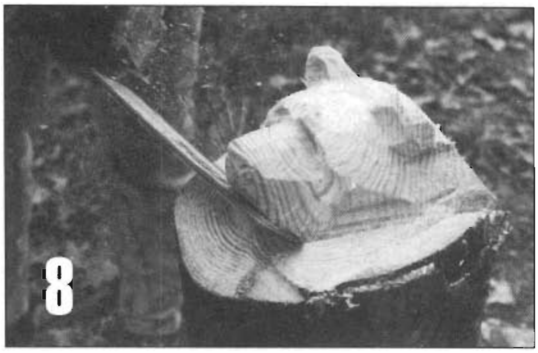




Move in several inches from these cuts, and make 45° slopes angling inward to the height of level 2. Remove the wood between these two cuts flush to level 2. Then make a series of cuts to round off Mr. Bear's ears. Stand back from the piece and be sure both sides are proportional and reshape if necessary.



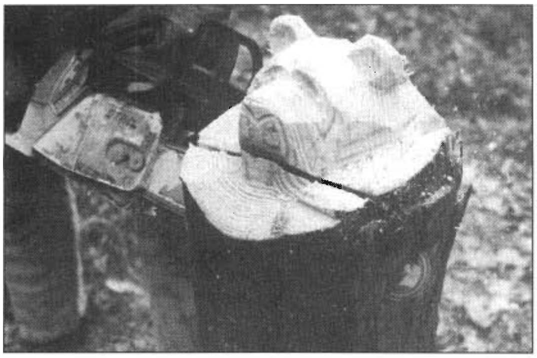
With a very light touch and only partial throttle, use the bar tip to hollow out the ears to a depth of about 1 1/2" and carefully round off all of the squared edges on the nose and face using a very light touch and low speed.



Now, just above the angled cuts on level 2, make approximately 1" deep slits for the bruin's eyes, and round out the edges. Cutting with the top of your bar, notch into the end of level 1 about 1/2" deep for the nostrils. Next, make a 45° downward cut about 4"-5" below the top of Bruno's nose.

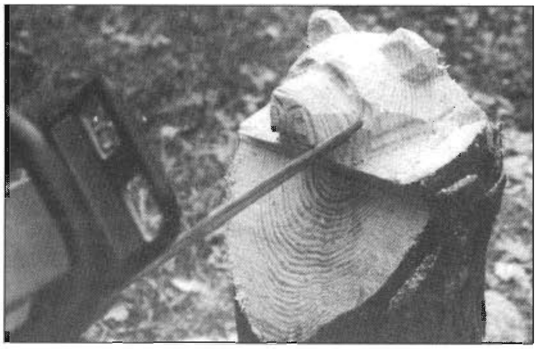
9

Using the top of your bar, make an upward cut at a 45° angle starting a foot below your last cut, sawing *toward the* bottom of that cut to remove this piece.



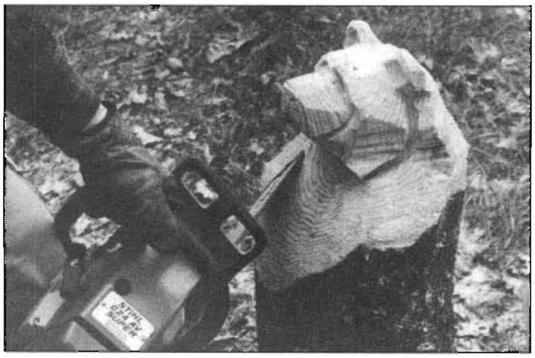
10

Starting about 3" below the bottom of the eye, make an inch–deep sloping cut for the mouth line on each side.



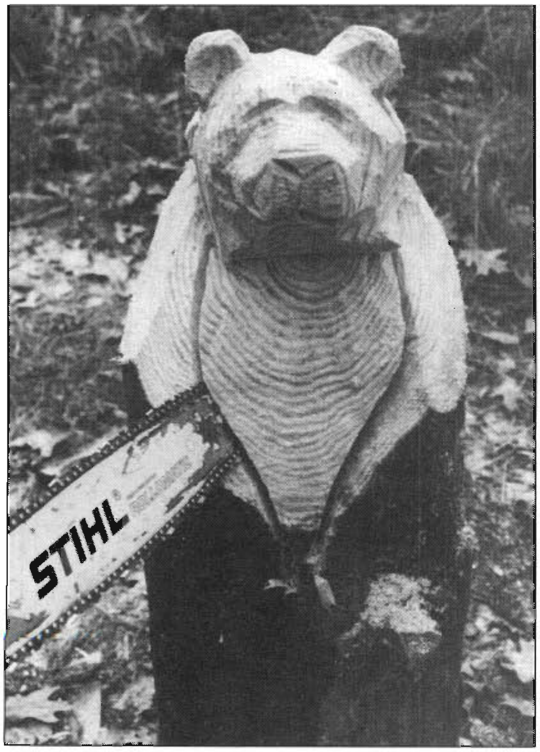
11

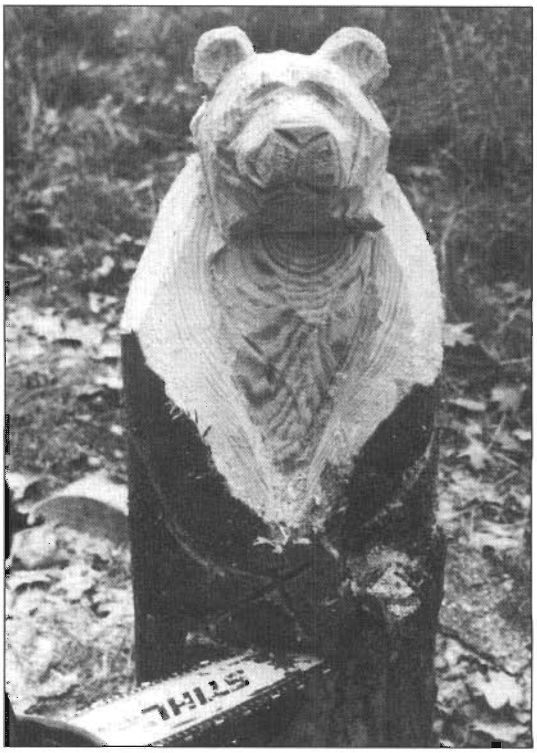
Now make a short cut angled downward on either side beneath the ears, then an angled upper cut about 8" below it to meet it.



12

Starting right below mid–cheek on Ol' Smiley, make a wishbone pattern about 3" deep that has the lines join at the bottom of your cut surface. Make an angled cut in from the center of his chest, and follow the bottom of your last cut all the way down on both sides of both cuts, and remove this material.

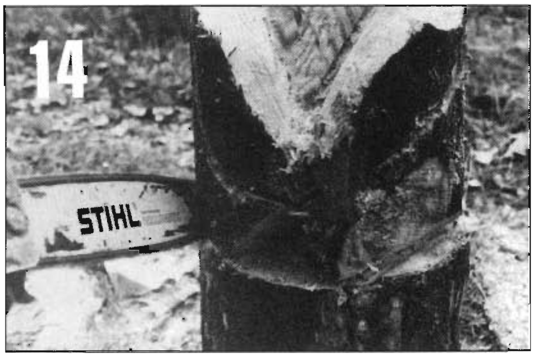


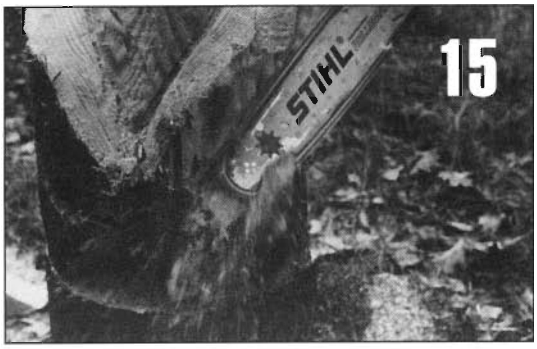


13

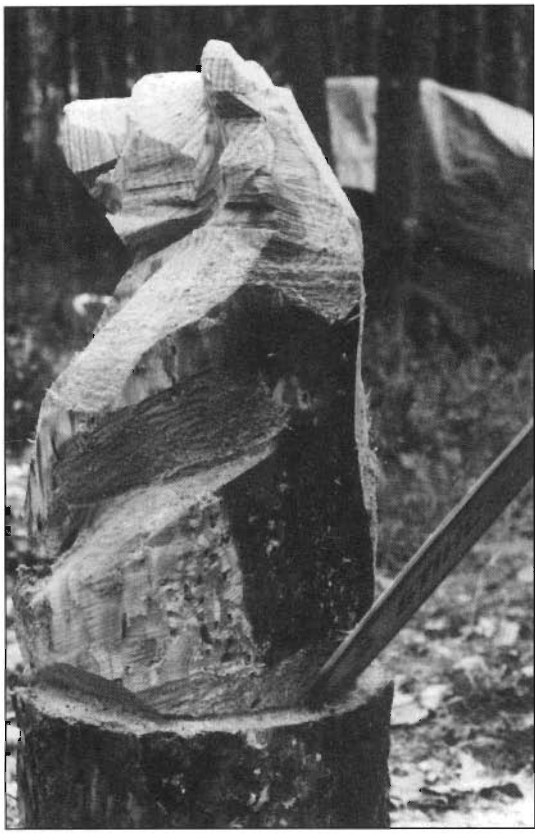
About 6" below your last cut, make two long, gradually curving cuts about 3" deep that cross each other and continue about 6". With another cut across the bottom, this should form a small triangle of wood. Make several more cuts on the inside to loosen it, then remove this triangle. (Or you can use a hatchet or axe to knock the chunk out.) Now shut off your saw, take a 15–minute break, refuel if necessary, and inspect your progress.

Restart your saw and cut a line all the way around the log at the same height as the bottom cut of the triangle. Call this the bottom line. Go about 4" deep, then back around to match your starting point.





Make angled cuts down to meet the cut that you made directly below the bear's arms. Make several cuts here to shape the rounded form that will be the arms. Now with the bar top, cut upwards to meet this cut again at a 45° angle from the bottom side. Finish off the arms by rounding off all of the squared areas and remove all of the bark.

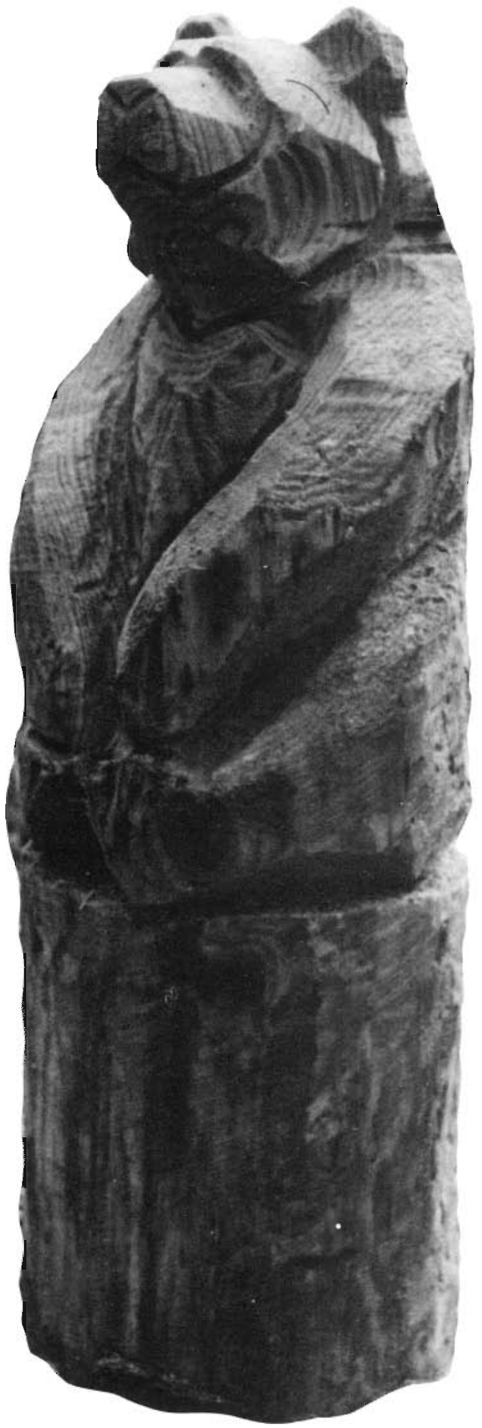


16

Square off Herr Bruin's back all the way down to your bottom line, and in a shallow "V" only about 3"-4" deep, lightly notch this last cut. Remove all of the extra bark all the way down to the bottom line with low chain saw speed and slow up–and–down motion.

Now make several cuts to remove the material down to the bottom line.

In the middle of the back just above the baseline, cut in slightly from both sides to make a shallow notch for the bear's tail. Now, with only partial throttle, go over the whole piece and round off any sharp edges. By running the bar tip carefully up and down the body, you can give your bear fur. Don't make the lines totally straight—put a little curve in them—and don't go more than 1" deep. Now clean up any rough edges and check to see that your proportions are correct. If not, carefully reshape matching parts such as cheeks, ears, arms, etc., until they are about the same size. Now you can dig the base out of the hole, and square it or shorten it up to your own tastes.



If you wish to, your bear can be stained, painted, varnished, or darkened with a propane torch. If the piece will be exposed to the elements, use exterior spar varnish.

You should definitely cover Bruno with paraffin or beeswax if you don't varnish him, and put the piece in a cool, shady, dry place so it can dry slowly, out of direct sunlight. Never bring a carving indoors into a sunny location right after carving, but give it time to slowly dry down. Some small cracks are to be expected, and they can be repaired easily with a homemade crack filler made of wood glue and sawdust, or a commercial wood filler. PW

Cake Top Finial

By Devore O. Burch

This unusual turning project is intended to decorate the top of a special occasion cake by holding the candles in a neat cluster. My wife Mary calls it a cake topper. Turn the finial from the wood of your choice—I've made them from walnut and mahogany.

Begin construction by mounting a piece of scrap wood on a small faceplate (Figure 1). Now glue the finial base to the scrap wood with a piece of thick brown paper in between and allow the glue to dry overnight. The brown paper from grocery shopping bags works just fine for this.

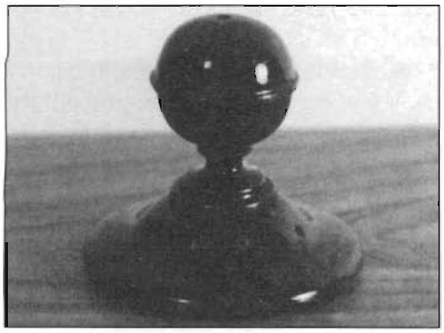
Turn the base as shown in Figure 2, sand, and bore a 1/2" hole in its center. Leave the base attached to the faceplate for now, but remove the faceplate from the lathe.

Prepare the finial itself by turning a cylinder between centers as shown in Figure 1. Turn a 1/2" diameter tenon on one end to match the hole in the base. Glue this cylinder to the base mounted on the faceplate. When the glue is dry, remount the faceplate, and finish turning the finial as shown in Figure 2.

Sand and finish the assembly while it's still mounted on the lathe. After applying the finish of your choice, remove it from the lathe and split the finial base from the mounting block along the paper glue line. Sand the base clear of scrap paper, and you're ready to drill the candle mounting holes.

Drill one hole in the top of the finial and 16 equally spaced holes around the base. The candles my wife uses require 3/16" holes. Drill them at a 20° angle (a drill press helps do this accurately). Drill a hole in the bottom of the base for a short, 1/8" diameter pointed dowel to stake the finial on top of the cake. The finial is now ready for cake top service.

Devore O. Burch is a woodworker in Fort Worth, Texas.



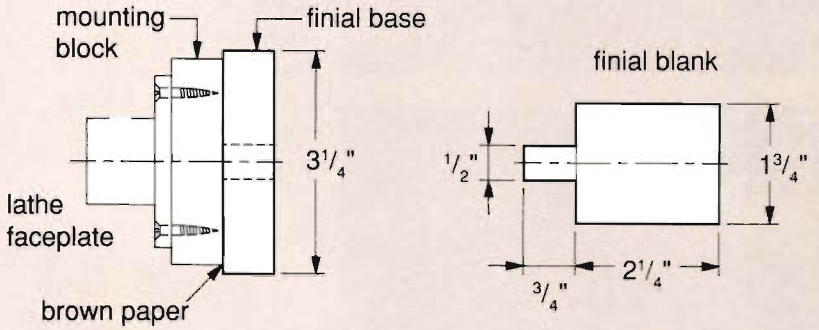


Figure 1. Faceplate Mounting

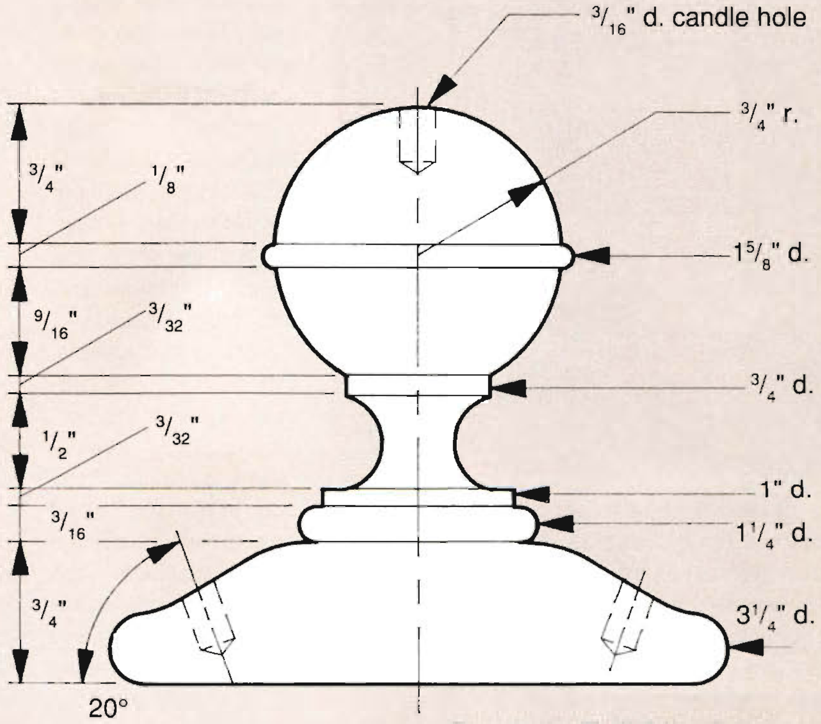
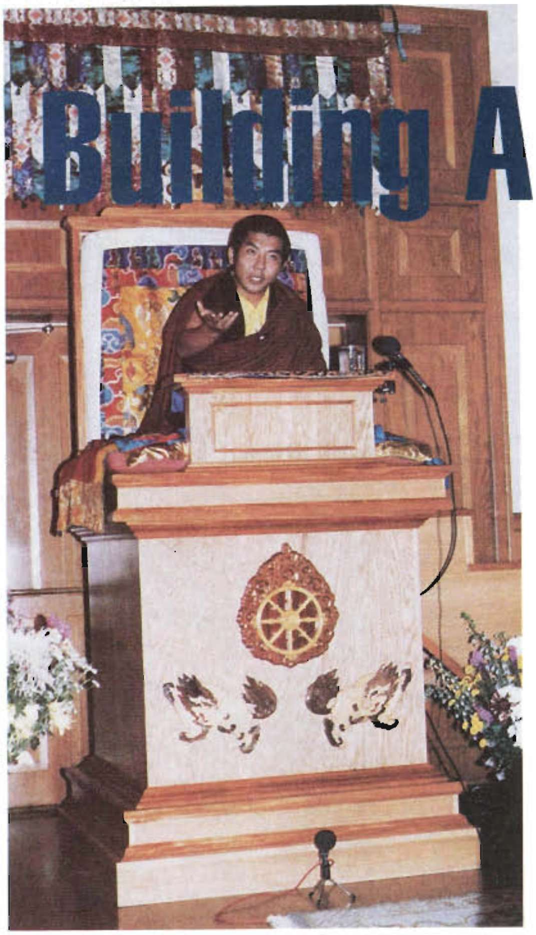


Figure 2. Full Size Pattern

One Craftsman's Most Unusual Commission:

Building A Buddhist Throne



The Six Jewels approach completion.

by Deborah R. Upshaw

California craftsman Henry Robertson has been working wood for over twenty years. His projects range from a tiny Oriental tea table to a picturesque post and beam mountain cabin. He's remodeled kitchens and baths, and built an elaborate array of store fixtures, cabinets and display cases. Making fine furniture is his real love because it offers him an opportunity for free creative expression. He likes to build with walnut, cherry, oak and mahogany, and often details his furniture with wenge, satinwood and pernambuco. Often his pieces incorporate marquetry details, sometimes featuring thirty or more wood types. Although you can catch traces of Craftsman and Japanese styles in his work, he prefers not to label his work. "My furniture is sleek and simple."

His most unusual project yet, a six–foot high Rinpoche Throne, may appear sleek and simple, but it's highly detailed and took several months to complete. It's installed in the Tibetan Buddhist Meditation Center in San Francisco, where thousands of Buddhists view it every year, and where it's used only by the highest ranking Buddhist teachers.

Robertson is a practising Buddhist himself, and says he had visions of building the throne before he was asked to do it. "The idea of making a Rinpoche Throne came to me during my meditations, but I had no purpose in doing it then. Eventually I was asked by Lama Lodö to build it for his Guru, the Venerable Kalu Rinpoche. And in my heart I was making it for my own root Guru and teacher, His Eminence Jam Gon Kongtrul Rinpoche."

In designing the throne and its intricate wood carvings, Robertson employed Buddhist symbols of enlightenment. Before starting, he built a complete scale model to solidify his conception.

"I used every tool in my shop—table saw, band saw, scroll saw, drill press, lathe, planer, jointer, and many hand tools." He made the structure from white oak plywood with contrasting Honduras mahogany moulding on the casework. The throne was built in seven subassemblies—stairs, back, top, middle, sides, front table, and graduated bottom.

"I designed it to come apart in sections so that it can easily be moved from one location to another. The center section, for example, is too large for most three–foot doorways, so I sawed it in half and then bolted it back together.

Robertson bolted a plate at the top of the stair assembly to connect it to the center section. The remaining parts are held together by the use of registration blocks or tabs. These were built into the four corners of the top piece, and into the corners of the graduated bottom. Within the body of the throne, Robertson used internal cross braces or struts to make it *sturdy and lightweight*. He filled small nail holes with a linseed based putty, and finished the throne body with a clear, semi–gloss lacquer.

Important Buddhist emblems appear on the throne's front face—the flaming dharma wheel and snow lions. Robertson explains its meaning: "The flaming dharma wheel signifies the Buddha going into the world and teaching. The two snow lions symbolize the truth of the teachings of the Dharma—the Dharma is the path of the Buddha and his teachings. And the roar of the lions signifies its truth."

The dharma wheel is made of three woods—padauk, pernambuco and satinwood. All the parts making up the dharma

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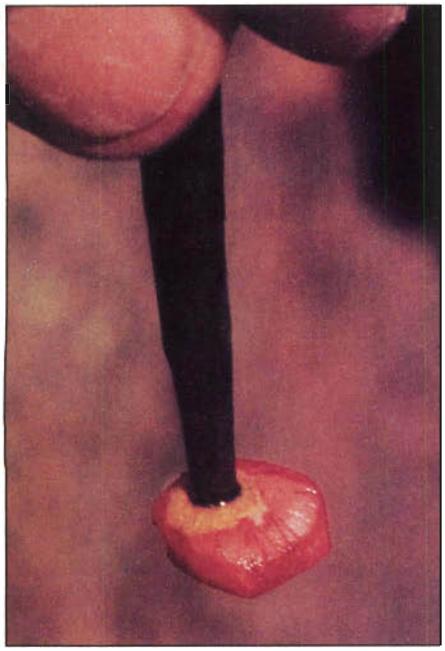
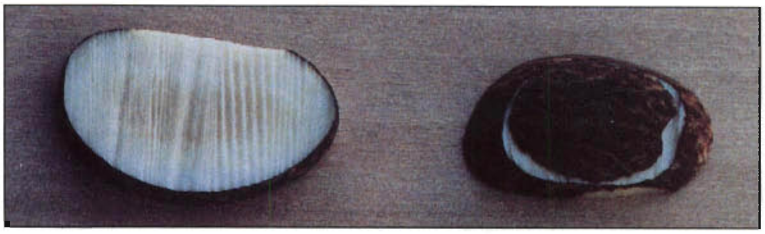
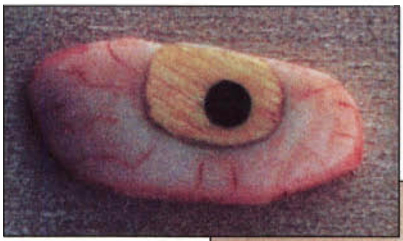
***Deborah R. Upshaw** is a freelance writer from Eureka, California and a frequent contributor to* Popular Woodworking.



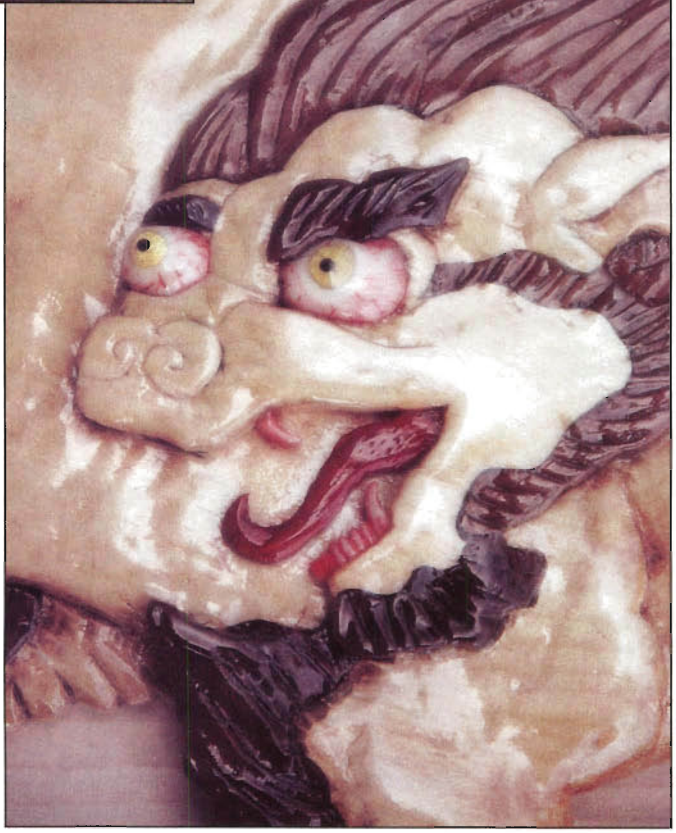
A small piece of ebony glued to the tagua slice forms the pupil.

Slices of tagua nut become the eyeballs of the Snow Lion.





The finished eye includes tagua nut, satinwood and ebony.

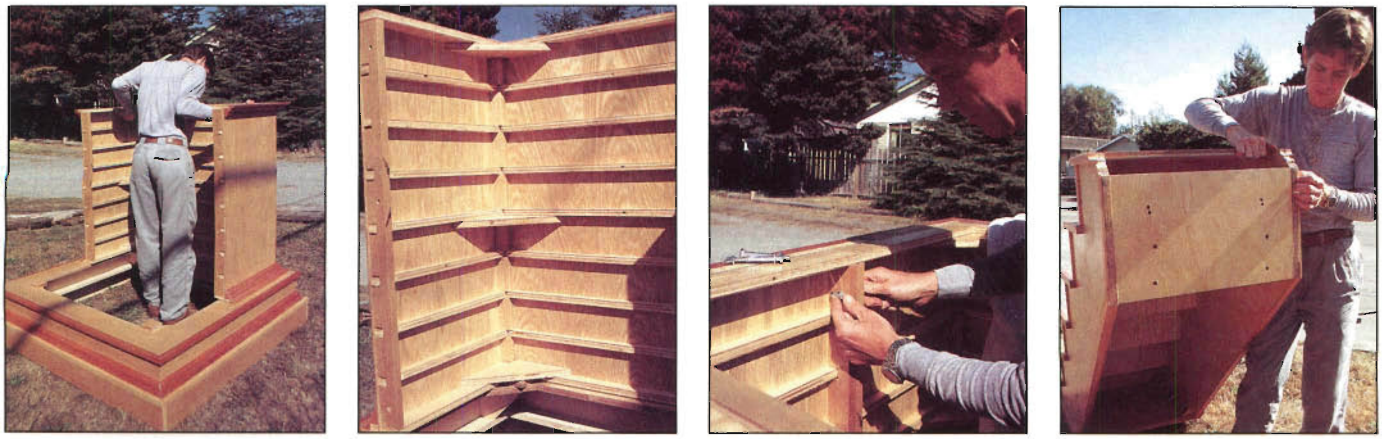


wheel were turned on a lathe, right down to the tiny satinwood buttons. Robertson cut away the enclosed design area with a scroll saw and drill press, and carved the remainder. Before starting to carve, he screwed the wheel onto a ¾" plywood base and clamped the plywood to his workbench. The carving took over sixteen hours and was quite a learning experience, according to Robertson.

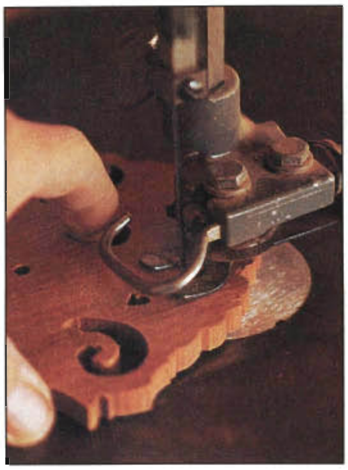
"The process of wood carving was relatively new to me. I had done some carving with soapstone, and that helped. But carving the dharma wheel was the scariest part of the the entire project. I wasn't sure how it would come out." He used a mallet and a variety of chisels and gouges to create depth. To help visualize the final, finished appearance as he worked, Robertson occasionally brushed mineral spirits onto the wood. To give further depth, he worked burnt umber oil paint mixed with turpentine into certain parts of the design, and added a glaze. He finished by spraying the wheel with a sanding sealer, sanding it well, and then spraying on up to ten coats of lacquer, sanding between coats with a low abrasive Scotch™ pad.

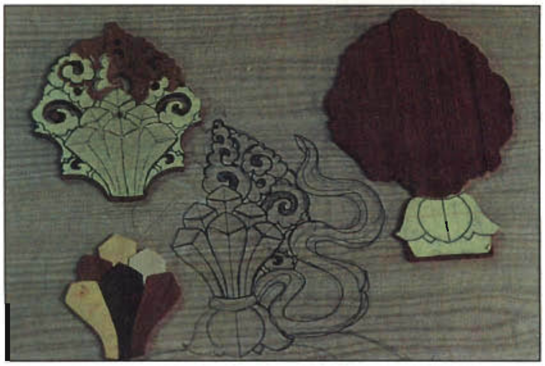
To carve the snow lions, Robertson first bandsawed the patterns from basswood. He then cut away certain sections and

In the sequence of photos below, Robertson mounts the sides on the throne's base, bolts the structure together, and adds the stairs.



Teeth are scrollsawn from tagua or "ivory nut."

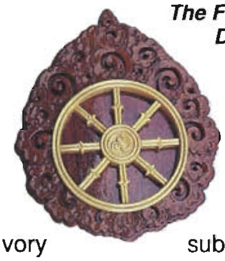




The Six Jewels' parts are bandsawn and carved.

The Snow Lion's walnut pieces are bandsawn and glued into place.

Mineral spirits brushed on the wood help the craftsman visualize the finished look.



The Flaming Dharma Wheel

replaced them with walnut. The walnut parts were glued to the basswood with a walnut colored epoxy, which he also used to fill small gaps. As with the dharma wheel, he clamped the lions to the workbench and carved the details with chisels and gouges.

The short row of teeth and fangs were carved from a tagua nut sliced into ¼" slabs. Also called ivory nut, the round, cream colored nut comes from the South American ivory palm and is one of the best ivory substitutes. The tagua nut served for the eyes, too. The reddish appearance resulted from rubbing an aniline dye into the nut. The indentations or veins of the eyes were scrimshawed into the tagua nut with a scriber. Robertson made the iris and pupil from satinwood and ebony. "I glued a small ebony piece into the satinwood and allowed it to dry thoroughly before sawing it off." He cut the lions' tongues from padauk with a band saw. Like the dharma wheel, the lions were finished with a semi–gloss lacquer.

The top piece of the Rinpoche Throne features another important Buddhist symbol—the Six Jewels. They represent Buddha—who discovered the path, Dharma—the path itself, Sangha—the community of Buddhists, Guru—one's spiritual friend, Yidams—deities linked with pure qualities of the mind, and the Protectors and Defenders of the Dharma. The background flames are made of pernambuco, the back plate is padauk, and the ribbons are basswood. The six jewels are made from padauk, basswood, satinwood and purple heart.

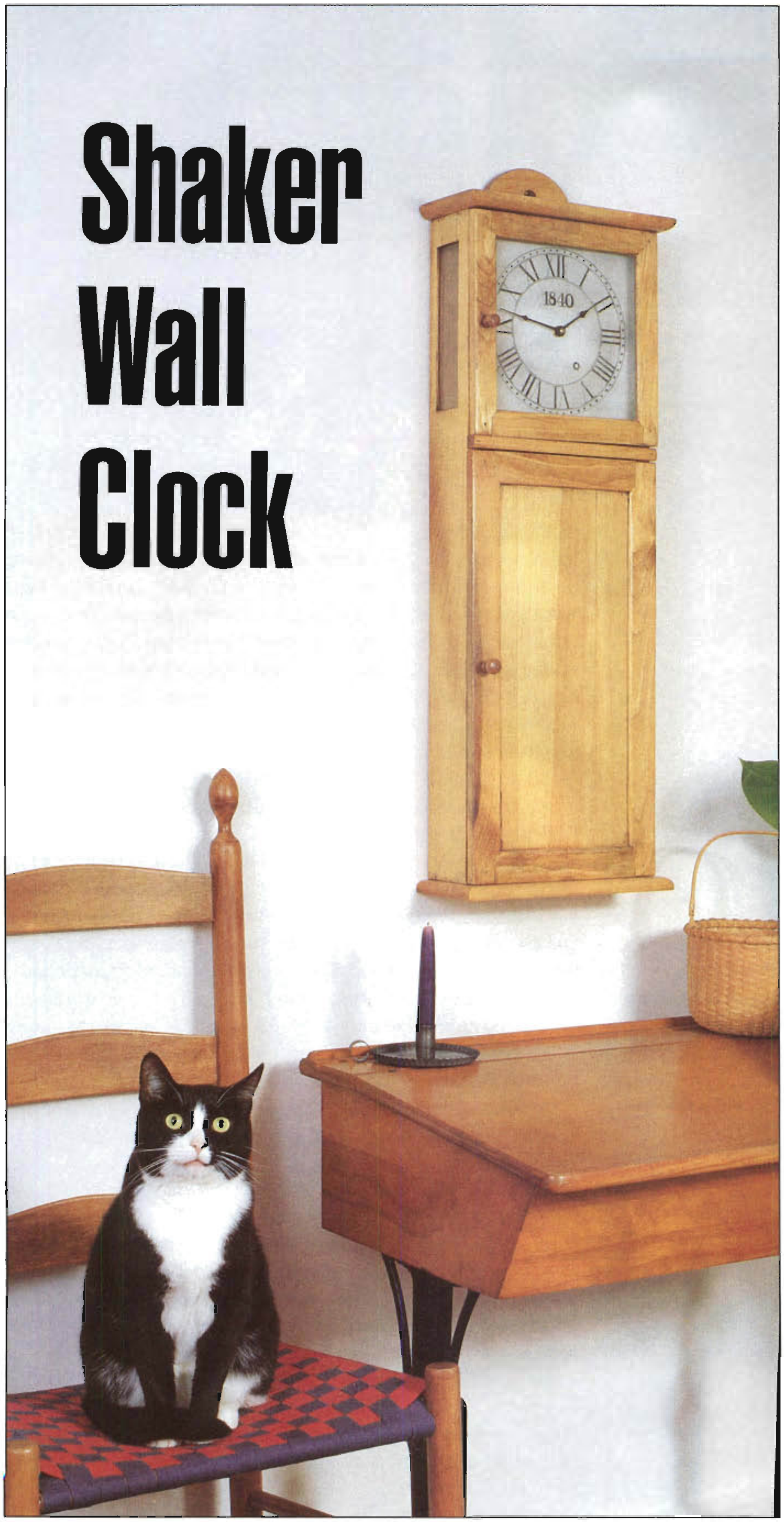
The top area of the throne, where the Six Jewels are featured, is where the Rinpoche sits in an Eastern style teaching or lotus position. Robertson had three–inch thick cushions fashioned for the top and the recessed back areas from an elegant gold and rust colored brocade. The small table at the front holds texts and ritual items.

Robertson says that the philosophy, code of ethics, beliefs and practices of Buddhism influence his attitude toward his work and his life. "Every religion is there to ease our sufferings and help us look at what's beyond the temporal joys and sufferings of our world. Buddhism has shown me a lot of ways to do that. It also emphasizes working with the mind—putting our minds at rest. I think it is a simple and direct way of relating to things."

He considers it a high honor to have been asked to build the Rinpoche Throne, and adds, "Having the opportunity to build a major devotional piece was a very worthwhile experience."

"Lama Lodö said it was beautiful, and I got to see my own Guru, Jam Gon Kontrul Rinpoche, using it." That was no doubt another satisfying experience. PW

Shaker Wall Clock



Deborah Porter

by John A. Nelson

One of the best Shaker clockmakers was Isaac Benjamin Youngs. Although he built tall case clocks, his most well known work is this small wall clock. It's particularly interesting in that the backboard was also the backplate of the wooden–gear movement. It was made of pine and had a light exterior stain and a dark walnut stained interior. Since the project goes together fairly quickly, you might want to order the clock parts before starting. I bought mine from S. LaRose, but you can select any pendulum movement you wish (see the Source List).

Cut parts A through H to the dimensions given in the Cutting List and sand the surfaces with medium to fine grit sandpaper. Cut out the 1¾" X 7½" windows at the top of each side piece (A) as shown in Figures 1 and 2. Cut a ¼" wide X ¼" deep rabbet along the back edge of the sides and across their ends. Notch for the four hinges—on the right side only. In order to install glass in the side windows, you'll

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***John A. Nelson** is a woodworker and drafting instructor from Peterborough, New Hampshire, and the author of many woodworking books, including* How to Build a Grandfather Clock *(TAB Books, Monterey Lane, Blue Ridge Summit, PA 17214) and* Fifty–Two Weekend Projects *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*

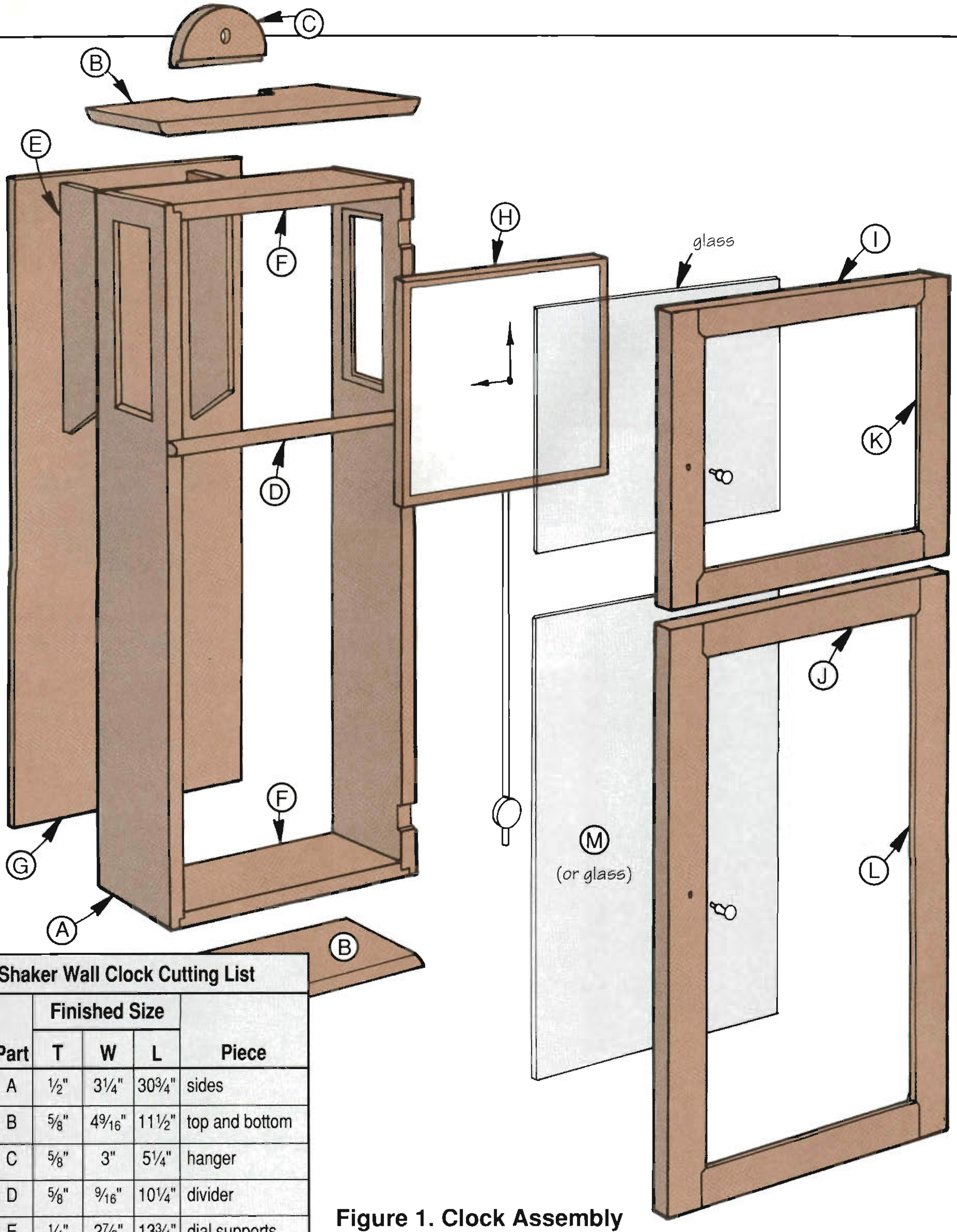


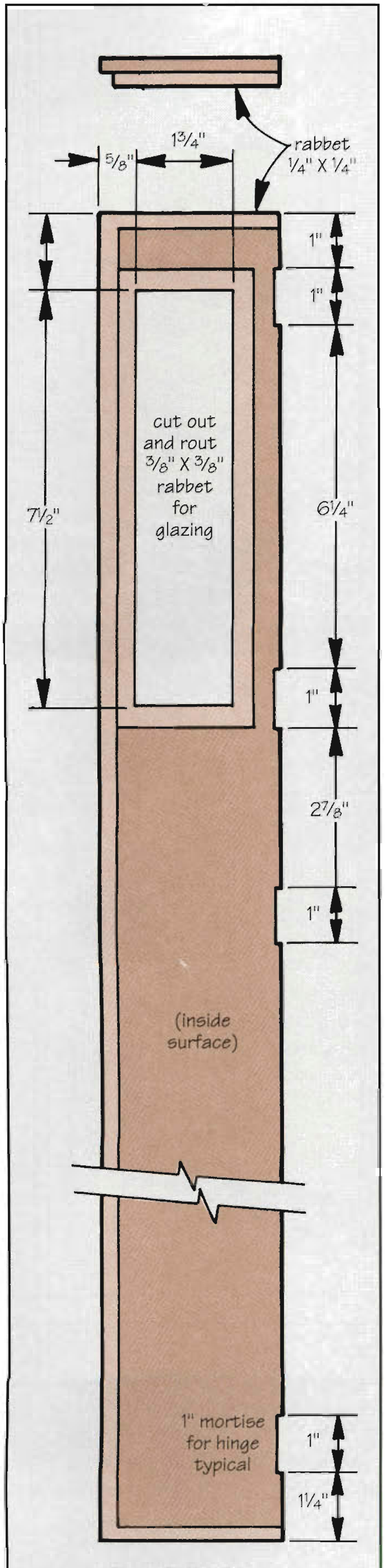
Figure 1. Clock Assembly

Shaker Wall Clock Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
2	A	½"	3¼"	30¾"	sides
2	B	⅝"	4⁹⁄₁₆"	11½"	top and bottom
1	C	⅝"	3"	5¼"	hanger
1	D	⅝"	⁹⁄₁₆"	10¼"	divider
2	E	¼"	2⅞"	13¾"	dial supports
2	F	½"	3"	9¾"	inserts
1	G	¼"	9¾"	30¾"	back
1	H	¼"	9"	9"	dial board
2	I	⁹⁄₁₆"	1¼"	9¾"	upper door rails
2	J	⁹⁄₁₆"	1½"	9¾"	lower door rails
2	K	⁹⁄₁₆"	1¼"	10¼"	upper door stiles
2	L	⁹⁄₁₆"	1½"	19⅞"	lower door stiles
1	M	¼"	7⅝"	17¼"	panel (or glass)

Sources

A variety of clock movements, both mechanical pendulum and less expensive quartz pendulum movements are available by mail from Klockit, P. O. Box 636, Lake Geneva, WI 53147. Tel. 1-800-KLOCKIT. Make sure you get a pendulum of the appropriate length—about 19" or 20".

The pendulum and movement I used for the clock in the photo were mail ordered from S. La Rose, Inc., 234 Commerce Place, Greensboro, NC 27420. Tel. 919-275-0462. Ask for pendulum movement #H812077, hands #816013 and dial face 133-874 (ivory).



5/8"
1¾"
rabbet ¼" X ¼"
1"
1"
7½"
cut out and rout ⅜" X ⅜" rabbet for glazing
6¼"
1"
2⅞"
1"
(inside surface)
1" mortise for hinge typical
1"
1¼"

Figure 2. Side (A)

Robert Chapla

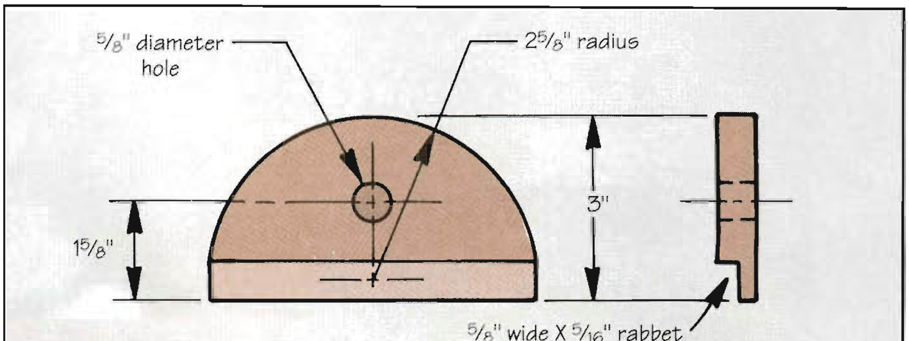


Figure 3. Hanger (C)

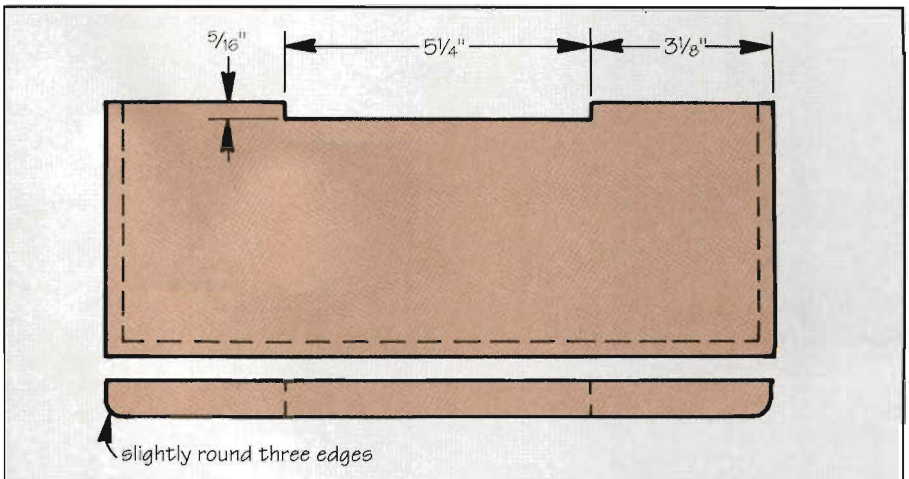


Figure 4. Top and Bottom (B)

need to rout a ⅜" X ⅜" rabbet on the inside surface.

In the top piece (B), cut a 5⁄16" X 5¼" notch centered on the back edge to receive the hanger piece (C). Shape the hanger, divider (D) and dial supports (E) as shown in Figures 3,4 and 5. Then round the front surfaces of the side, top and hanger pieces. Sand all parts again, keeping the edges sharp.

Dry fit the box assembly as shown in Figure 1. When everything fits well, glue and nail the parts together. Use the glue sparingly and, for authenticity, use ¾" and 1" square cut nails from the Tremont Nail Company, Box 111, Wareham, MA 02571 (phone 617-295-0038). Be sure to check that the box is square before the glue sets. Temporarily tack the divider (D) in place—you'll adjust it later when you install the doors.

If you want to see the movement through the two side windows, cut notches in the dial supports (E), lining them up with the windows. If you haven't already cut the dial board (H) to size do so now, and sand it all over.

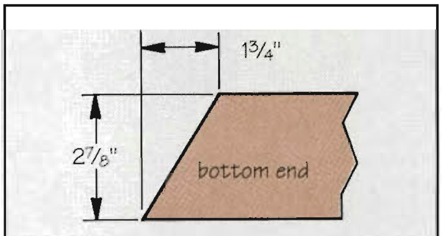


Figure 5. Dial Support (E)

The door assemblies are the only part of this project that may prove a bit difficult, so take your time and measure accurately. Plane the stock for the rails (I and J) and stiles (K and L) to their 9⁄16" thickness. Cut a 3⁄16" radius on one edge of each piece and a ¼" wide X ⅜" deep notch for the glass (or door panel) as shown in Figure 6. Very carefully cut the rails and stiles to length. Mortise the ends of the stiles and cut matching tenons in the ends of the rails, shaping them as shown in the detail to Figure 6.

You're ready to dry fit the door parts and check their fit to the case. Add the door panel (M) to the bottom door now unless you want to install glass there. Glue the door pieces together and, for extra strength and an authentic look, use ¾" square cut nails again. After the glue sets, fill in any loose joints and sand all over, keeping all

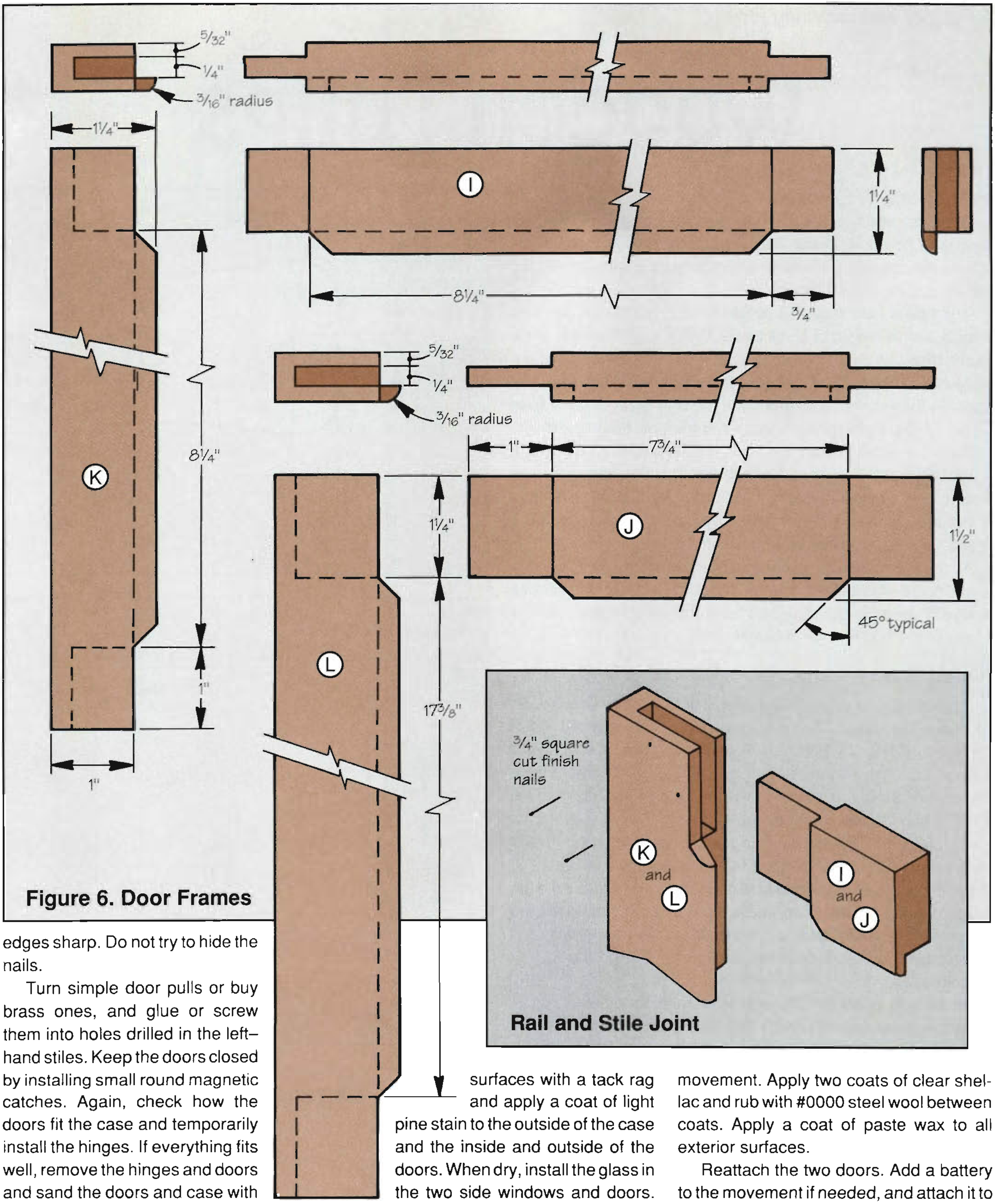


Figure 6. Door Frames

Rail and Stile Joint

edges sharp. Do not try to hide the nails.

Turn simple door pulls or buy brass ones, and glue or screw them into holes drilled in the left–hand stiles. Keep the doors closed by installing small round magnetic catches. Again, check how the doors fit the case and temporarily install the hinges. If everything fits well, remove the hinges and doors and sand the doors and case with very fine grit paper.

Temporarily attach the two dial supports (E) by tacking or screwing them in place from the back. Add the dial board (H), which you'll later attach with four 3/4" square–cut finish nails.

You're now ready for finishing. Clean all surfaces with a tack rag and apply a coat of light pine stain to the outside of the case and the inside and outside of the doors. When dry, install the glass in the two side windows and doors. Use a dark gray putty (if you can find it) for all glass.

Now glue and nail the dial supports in place, and glue the paper dial face to the dial board, making sure that it's centered inside the top door. Drill a hole in the dial board for the center shaft of the clock movement. Apply two coats of clear shellac and rub with #0000 steel wool between coats. Apply a coat of paste wax to all exterior surfaces.

Reattach the two doors. Add a battery to the movement if needed, and attach it to the dial face with a washer and nut. Screw or nail the dial board to the dial supports with the movement attached to its face and hang the pendulum. The clock should be hung on a peg (Shaker, of course). With any luck your clock, too, will last for 150 years. PW

Wooden Tulips

by Howard V. French

After your spring bulbs have stopped producing tulips, you can keep your home filled with Dutch charm by making these decorative projects. Easily mass–produced, wooden tulips can be big sellers at craft shows, too.

The flower bud itself is a simple lathe project. You can turn several from a length of stock that is 1½" X 1½". Turn the stock round, then use a parting tool to mark off individual buds that are 1¾" long. Allow plenty of space between buds so you can get your chisel in there to cut a V–groove in the end grain of each (see Figure 1). Sand them on the lathe and then cut them apart.

To drill the hole for the stem, make a jig to hold the bud in place on the drill press. Just use a 1½" paddle bit to drill a hole in a piece of scrap and clamp this block to the drill press table. Drill a ¼" hole in the underside for the stem; then flip the bud over, and use a countersink to make the indentation in the top.

To finish detailing the bud, use a sharp knife or a triangular file to make grooves around the rim indicating petals. One groove every 90° or so is about right. I tap three straight pins into the center of the bud to resemble stamens.

Potted Tulips

To display your tulip on a windowsill or as a table centerpiece, you'll need to "plant" it in a pot. Laminate four lengths of 1 X 4 to make a 3½" X 3½" blank. Cut it into 3½" lengths, and turn your pots according to the diagram in Figure 2. Sand them smooth, but don't worry about the bottom or the top (except for the rim). Drill a ¼" hole in the top center of each.

To make the leaves for your potted tulips, make 30° cuts halfway into one edge of 1 X 2 material as shown in Figure 3. Trace the full–size leaf pattern from the PullOut™ Plans onto the stock, and cut out the shape on a band or scroll saw. Trim the bottoms of the leaves to different lengths so their height will vary. Shape the tops on a disk sander and then sand the leaves smooth.

Apply glue to the 30° flats and press them together in threes. Wrap the assembly with rubber bands to secure it while the glue sets. When it's dry, drill a ¼" hole through the center of the assembly. Insert a 9" length of ¼" dowel through this hole and glue it in place with ⅝" protruding from the bottom.

Wrap the protrusion and the top ½" of the dowel with masking tape and paint this foliage assembly an appropriate shade of green.

If you choose bright yellow for your tulip, choose another color (brown or red) for its pot. If you prefer bright red tulips, make their pots yellow or brown. Using a "Q–tip" as a paint brush, touch the tops of the "stamens" with a contrasting color. It is not necessary to paint the bottoms of the pots, or the tops except for their rims.

***Howard V. French** lives in Abilene, Texas where he spends his time dreaming up woodworking project ideas.*

Figure 1. The Bud

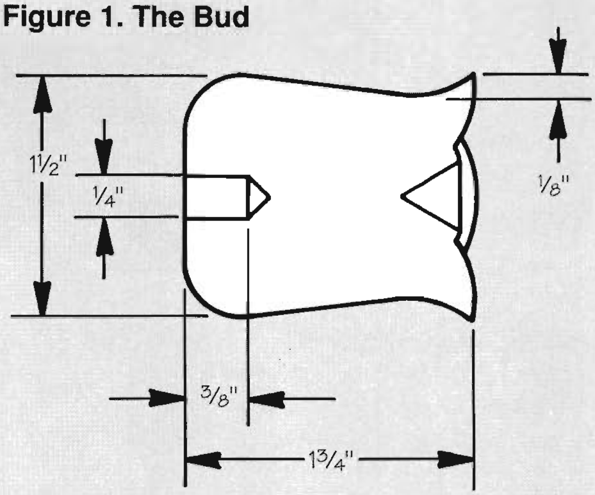
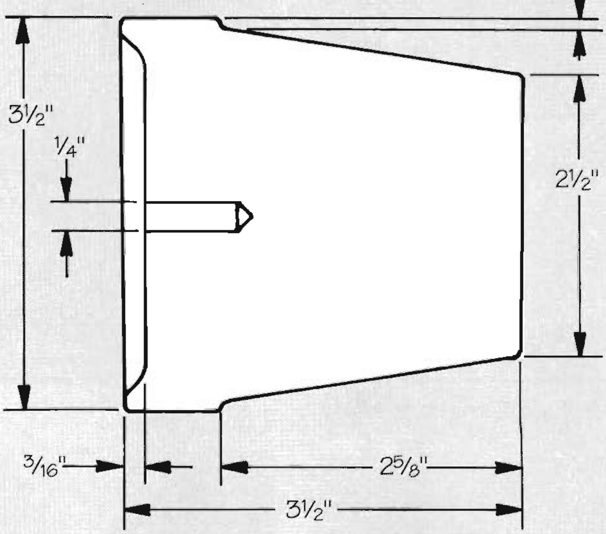
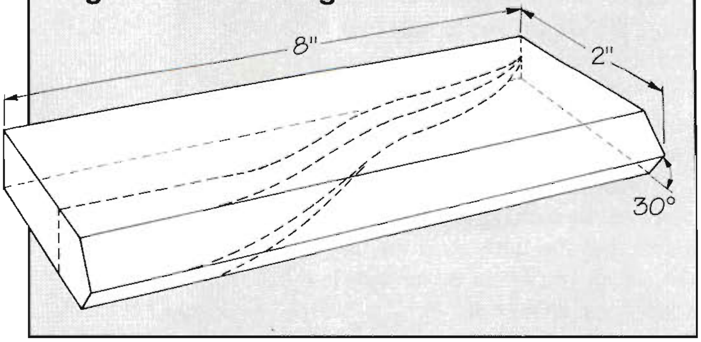


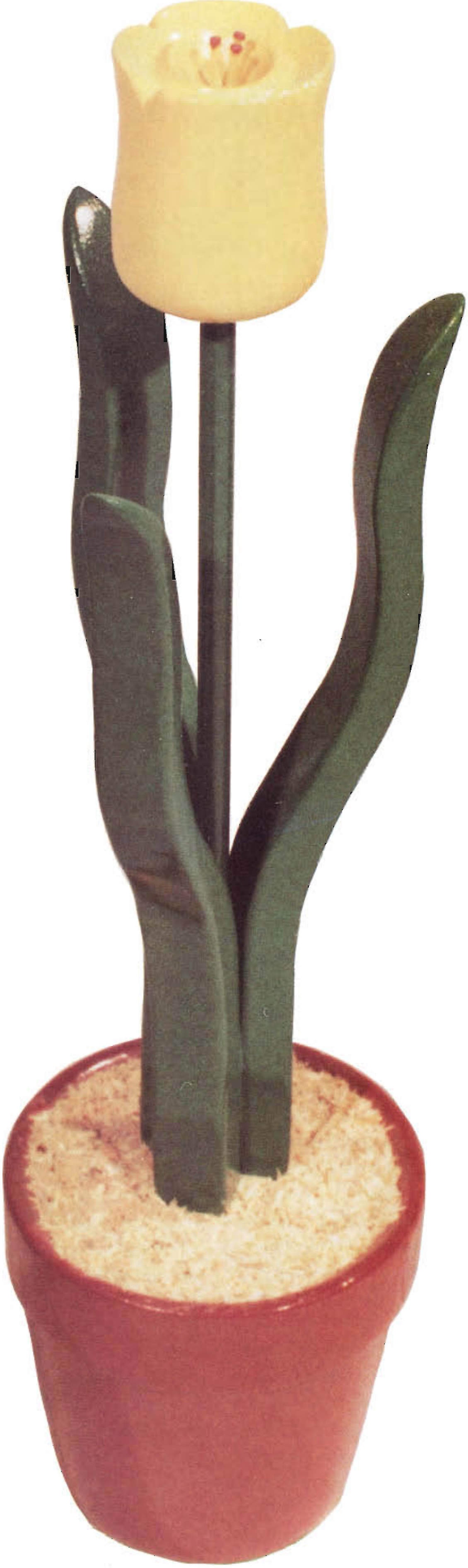
Figure 2. The Pot

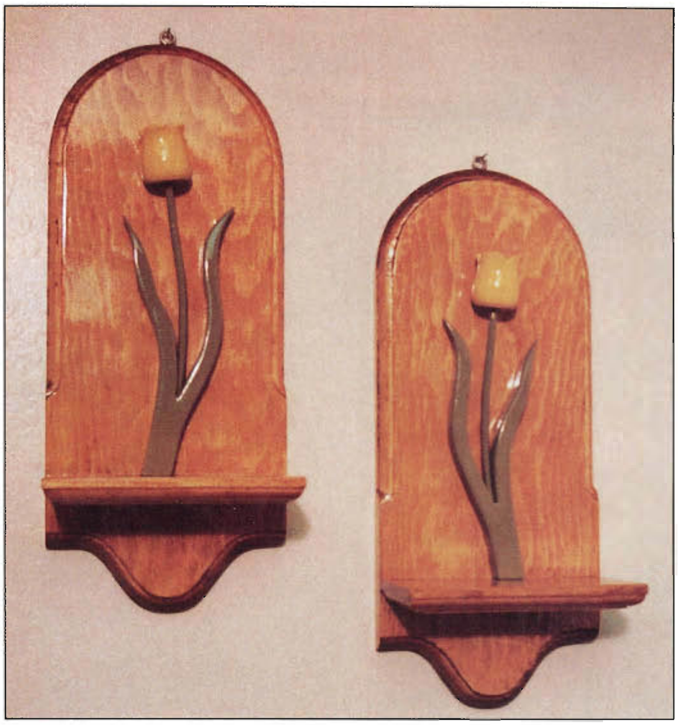


Robert Chapla

Figure 3. The Foliage







Phil Fischer

Once these components are painted and dry, final assembly is easy. Remove the masking tape from each end of the stem. Apply a small amount of glue to the bottom portion of the stem and to the bottom of the foliage pieces, and press them into the ¼" hole in the top of the pot. Put a drop of glue into the ¼" hole in the tulip and press it onto the top of the stem.

Using a small artist's brush, "paint" the top of the pot with glue—from the foliage out to the rim. Sprinkle clean sawdust onto the wet glue to simulate potting soil. Finally, glue a 2½" circle of felt to the bottom of the pot.

You may want to leave off the pots on some, and extend the stem pieces to about 3" below the foliage pieces. Such "flowers" may the be stuck into the soil of whatever greenery—indoors or out—to further brighten any bed, planter or pot.

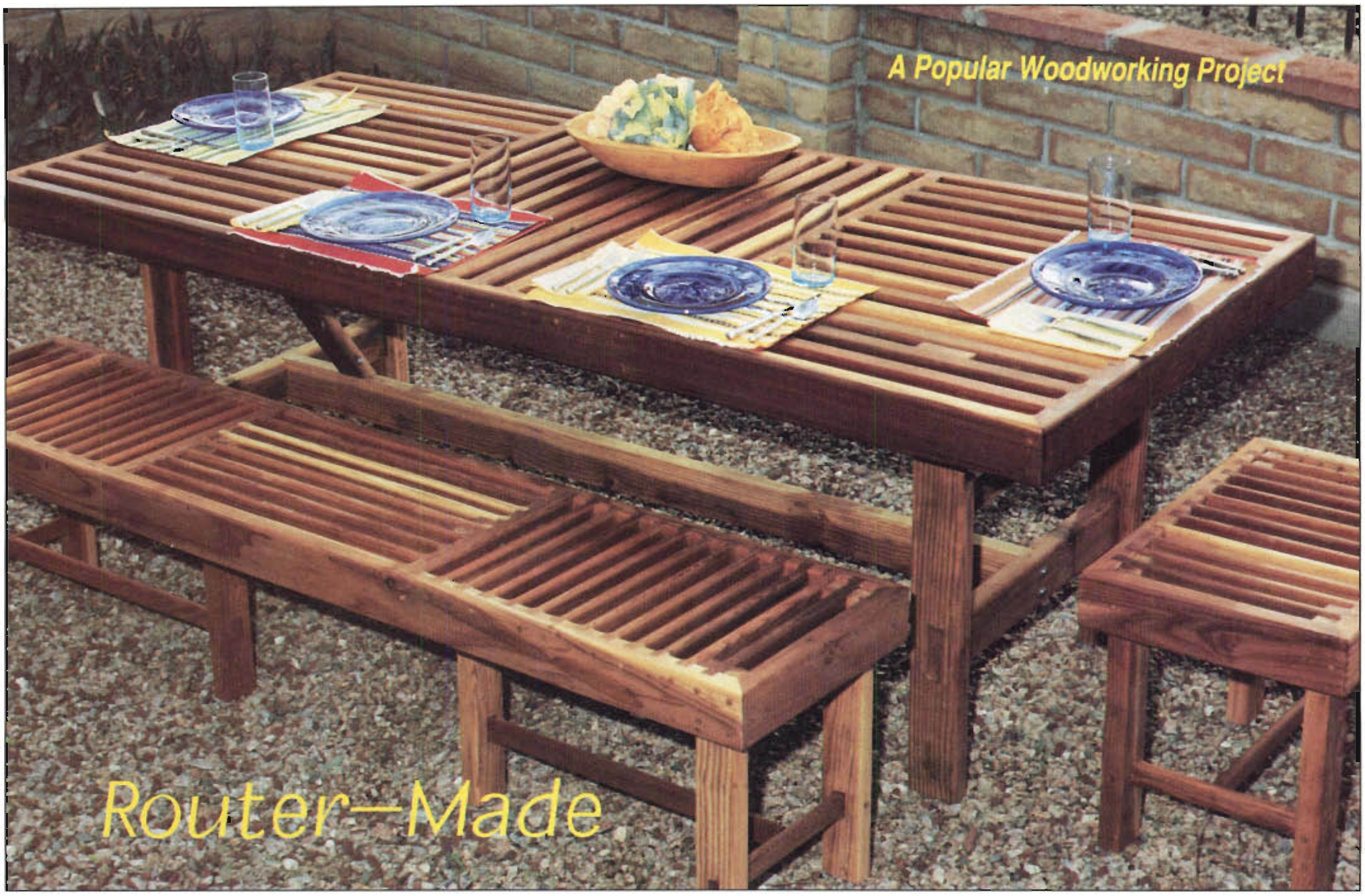
Tulip Wall Plaques

Using the same tulip buds described earlier, you can make a pair of these decorative plaques with small display shelves. The plaques and shelves are cut from 1 X 8 pine, though you could use whatever material you choose. Cut the plaques to shape using the pattern in the PullOut™ Plans. Rout the edges of the plaques as indicated, as well as three sides of each shelf. Drill and countersink holes in the plaque for attaching the foliage and the tulip bud.

Yet another full–size pattern can be found in the PullOut™ Plans for the wall plaque foliage. Cut this out of some 1 X 3 material, drill a ¼" hole in the crotch of the "V," and sand the piece smooth.

Make the curved stem from a 6½" length of ¼" outside diameter tube stock and epoxy it into the hole in the foliage. Paint and finish all the parts as you like; then sand a flat area on the back of the bud near the bottom. When you put all the pieces together for final assembly, arrange the foliage and the curve of the stem so that your two plaques will be dissimilar.

All that remains is to install appropriate hanging hardware and decide which wall to hang them on. PW



Router-Made Redwood Picnic Table

by Hugh F. Williamson

This redwood picnic table and benches with their ribbed tops will add a touch of class to your patio or backyard. Besides creating an interesting design, the ribs permit quick drainage when it rains. They're recessed into dado slots and secured with waterproof glue and rust resistant screws. Depending on the tools available to you, the dadoes can be either through or blind. Both types can be cut with a router or on a saw using a dado cutter.

Obtain the best available grade of redwood for the tops of the table and benches. Knots and multiple dadoes are a poor combination. Construction grade redwood will work fine for the legs and the braces.

Seat First

Build the bench tops first to develop a feel for the project. Cut the sides (A), ends (B), and top braces (C) for the long bench to the sizes given in the Cutting List. You can also cut the ribs (D and E), legs (F) and remaining braces (G–H) now, or wait until after assembling the top. Cut the corresponding parts (I–N) for the short bench as well. When making numerous repetitive length cuts, use a stop on your saw so the pieces will all measure the same. I suggest you give all the bench and table side and end pieces (A, B, O, P, S and T) about an inch extra and wait until after you've finished routing the dadoes before mitering their ends.

The long bench top measures 15¾" X 72" and is divided into three sections by a pair of top braces, while the short bench top is 15¾" X 23¼" and needs no top braces (Figure 1). Both have ¾" ribs spaced 1" apart. The table top is of the same basic design and construction as the benches. Its sides (O) and ends (P) will, however, require wider dadoes to accommodate its 1½" wide top braces (Q) and ribs (R, S and T).

Accurate routing of the rib and top brace dadoes is essential and requires the simple fixture described in the Jig Journal on page 38. Clamp the mated pairs—sides and top braces (A and C) for the long bench; sides (I) for the short bench; sides, ends and top braces (O, P and Q) for the table—to a solid worktable and rout both parts at the same time to ensure perfectly matched dadoes. Figure 2 shows the dado layout for the table sides, ends and top braces.

Practice first on a pair of scrap 2 X 4's long enough to include a dozen or so dadoes. Measure carefully to see if your work has been precise. You don't want the last rib space to end up wider or narrower than the other spaces when you miter the pieces to their finished lengths. Even a tiny error introduced during routing can accumulate to make a visible difference in the width of this space. Because other pieces will be affected, adjusting the finished length to accommodate the error will create more head

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***Hugh F. Williamson** is a woodworker in Tucson, Arizona, and a frequent contributor to* Popular Woodworking.

aches than making the operation accurate from the beginning.

When cutting through dadoes for top braces and the table's leg support ribs (S), back up both outer edges of the paired workpieces with full thickness scrap to minimize chipping as the router bit enters and leaves. Be certain to secure the bit in the router chuck tightly—this is no project to have it come loose!

If you like, through dadoes can be used exclusively, but the ribs will be better supported if you stop all the dadoes receiving rib ends. Since the router bit will leave the dado with a curved end, consider rounding over the lower edges of the rails for a good fit. After cutting the table dadoes—which require two passes with a ¾" bit, you'll need to chisel out the point left inside the groove at the end.

(continued page 56)

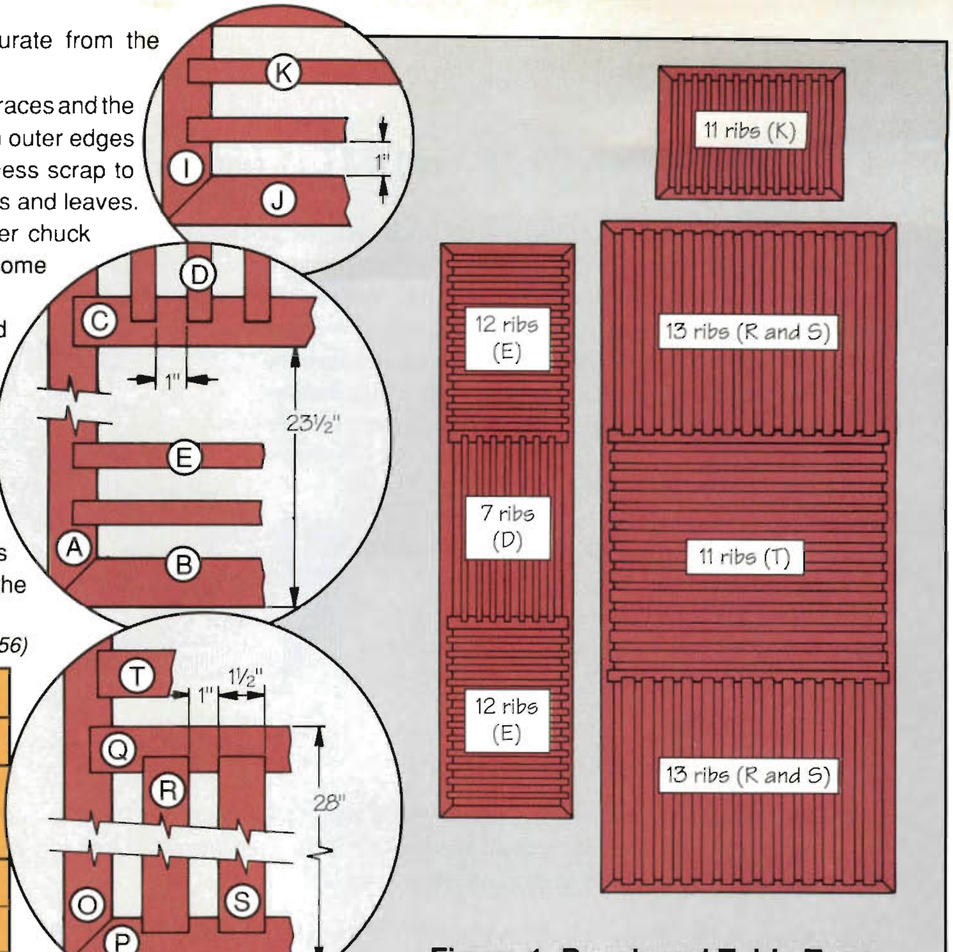


Figure 1. Bench and Table Tops

One Short Bench

Cutting List

Qty	Part	Finished Size			Piece
		T	W	L	
2	I	1½"	3½"	*23¼"	sides
2	J	1½"	3½"	*16¼"	ends
11	K	¾"	1½"	14¾"	ribs
4	L	1½"	2¾"	17¾"	legs
2	M	¾"	1½"	13¼"	leg braces
1	N	¾"	1½"	18¼"	leg brace

The simple router frame guide shown below is most effective with a plunge router. If you plan to make more than one picnic set—or if you just enjoy jigs—see the routing aid on page 38.

One Long Bench

Cutting List

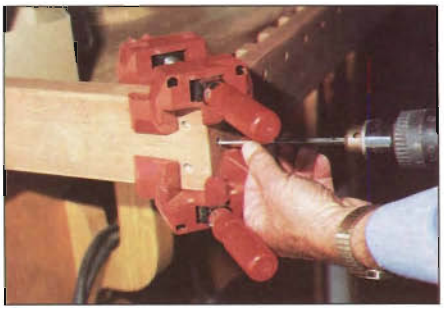
Qty	Part	Finished Size			Piece
		T	W	L	
2	A	1½"	3½"	*72"	sides
2	B	1½"	3½"	*16¼"	ends
2	C	1½"	3½"	14¾"	top braces
7	D	¾"	1½"	23½"	ribs
24	E	¾"	1½"	14¾"	ribs
6	F	1½"	2¾"	17¾"	legs
2	G	¾"	1½"	13¼"	leg braces
2	H	¾"	1½"	22¾"	leg braces

Picnic Table

Cutting List

Qty	Part	Finished Size			Piece
		T	W	L	
2	O	1½"	3½"	*84½"	sides
2	P	1½"	3½"	*36"	ends
2	Q	1½"	3½"	35"	top braces
22	R	1½"	1½"	26"	ribs
4	S	1½"	3½"	26"	leg ribs
11	T	1½"	1½"	34½"	ribs
4	U	1½"	3½"	29"	legs
2	V	1½"	3½"	24"	leg braces
1	W	1½"	3½"	46"	main brace
2	X	1½"	1½"	24"	angle braces

*cut oversize and miter to length after milling dadoes



In the far left photo, the short bench top is ready to receive its ribs. Note that they've been rounded on the bottom to fit the stopped dadoes.

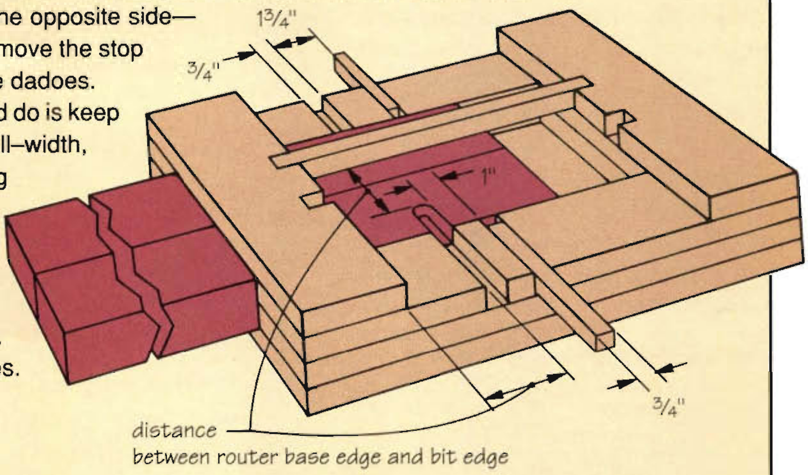
Assemble the sides and ends before installing the ribs. Corner clamps are a big help in holding the mitered corners in position for gluing and screwing.

A Device for Routing Multiple Dadoes

If you plan to make more tables and benches (or if you just enjoy making jigs and fixtures), consider the "souped–up" guide frame *shown here*. In this version, once you've marked the first cut on the workpieces and aligned it with the jig's bit slot, the index keys and slots will position each new cut as you proceed. Note the removable stop block for cutting a rib dado on one piece and—after replacing it on the opposite side—cutting a matching rib dado on the other piece. Remove the stop block altogether, of course, for the full–width brace dadoes.

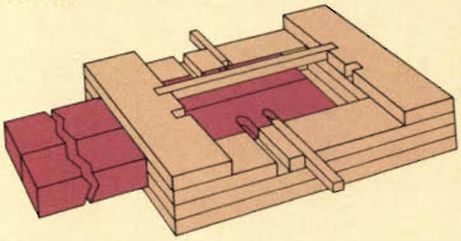
If you dimension the jig accurately, all you'll need do is keep track of the number of dadoes, which ones are full–width, and where on the workpieces they start. The jig should hold the workpieces fairly tightly, or you'll be clamping and unclamping over and over.

The same jig will work for both the ¾" bench dadoes and the 1½" table dadoes because the index slots are not in line but adjacent to each other, permitting the 1½" dadoes to be cut with two passes.

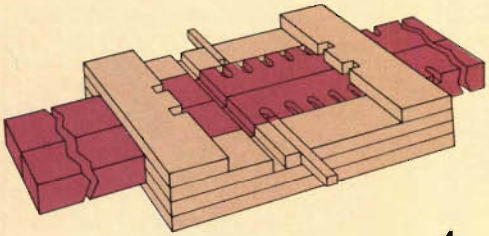


Long Bench Dadoes

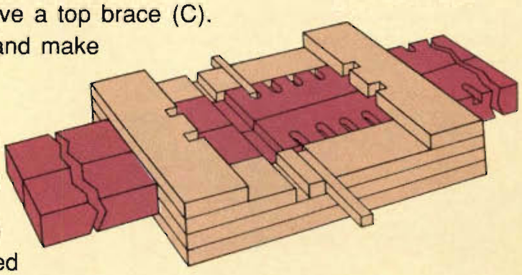
1 Mark the position of the first rib dado at one end of the pair of long bench sides (A) and align the mark with the bit slot. Insert the stop block on one side and cut the first dado. Then move the stop block to the other side and cut the matching dado. The setup should now appear as shown above.



2 Now slide the pieces through the jig until the dado lines up with the first index slot and you can insert the key. Cut the second pair of dadoes, again moving the stop block between cuts.



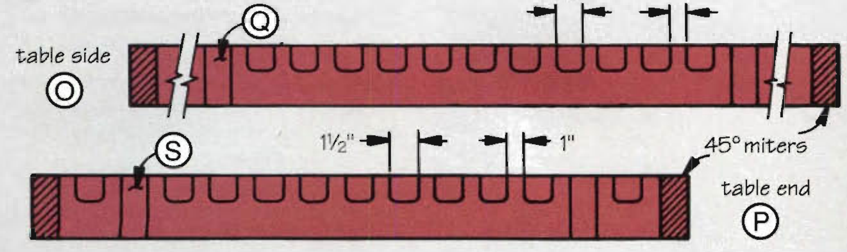
3 Continue the procedure until you have 12 pairs of rib dadoes. The next cut must be twice as wide and run across the full width of both side pieces so they can receive a top brace (C). Remove the stop block and make your first pass.



4 Slide the pieces until the last rib dado aligns with the second index slot and you can insert the key. Make your second pass to produce the 1½" through dado. Now measure 28½" further, slide the pieces until the mark lines up with the bit slot's leading edge, and repeat this step. Both index slots can be keyed into the 1½" dado when setting up for the second set of rib dadoes. The short bench sides (I) require only ¾" rib dadoes.

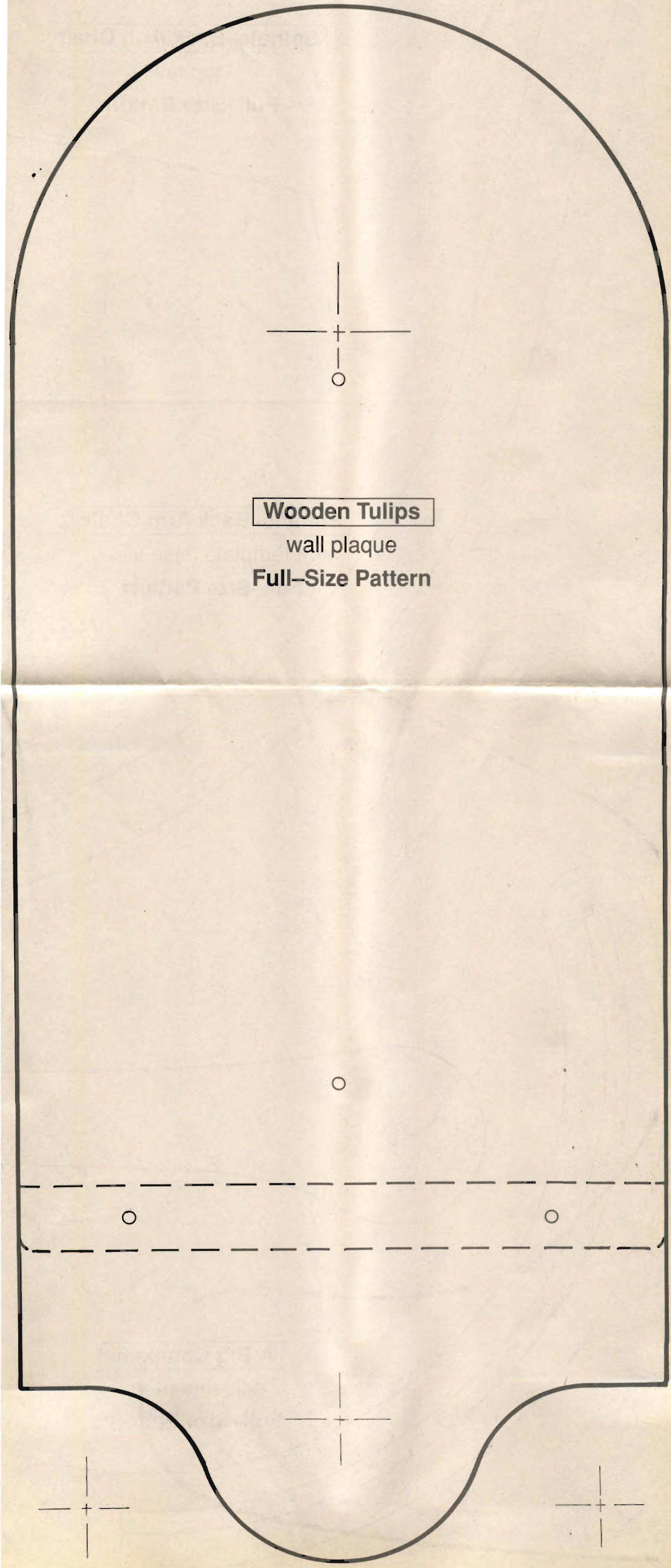
(continued on page 55, after the PullOut™ Plans)

Figure 2. Table Dadoes

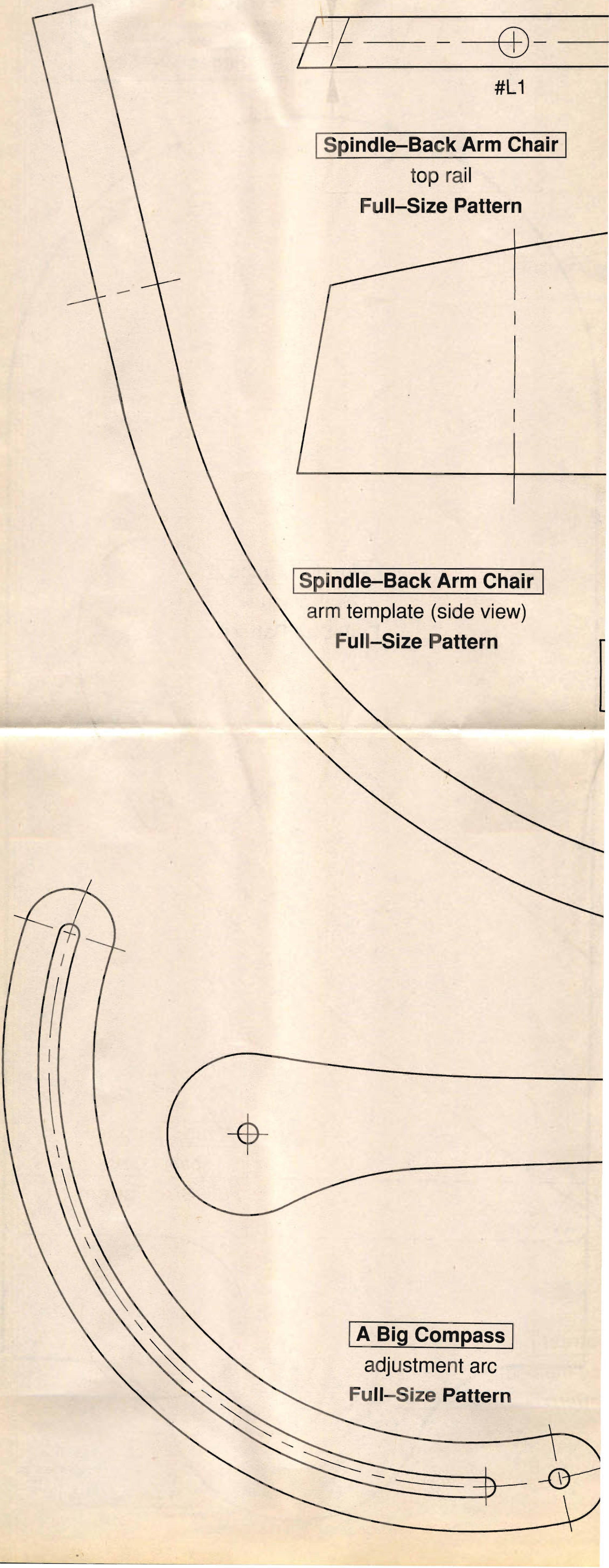


With so many 3" screws to drive home, a power driver is a welcome hand.

PullOut™ Plans
Popular Woodworking No. 60
May 1991
Pages 39—54



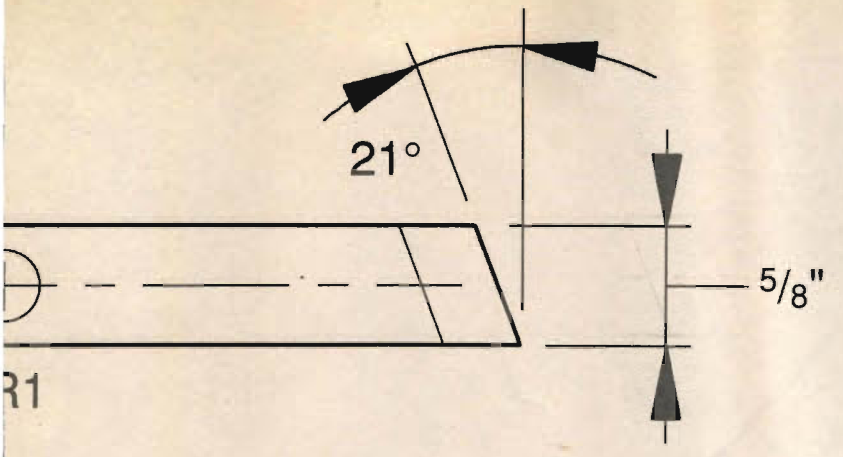
Wooden Tulips
wall plaque
Full-Size Pattern

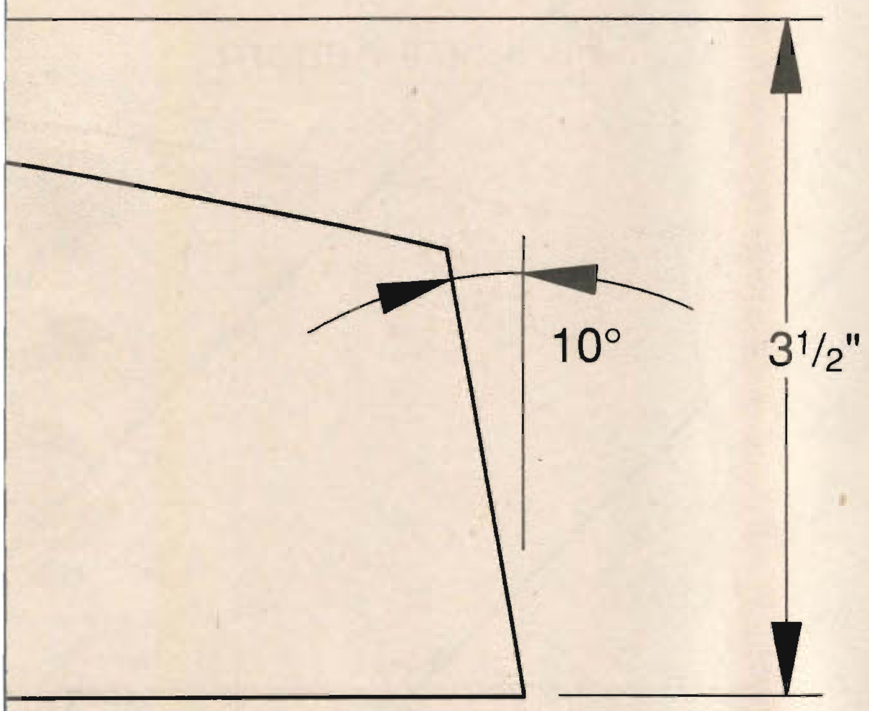


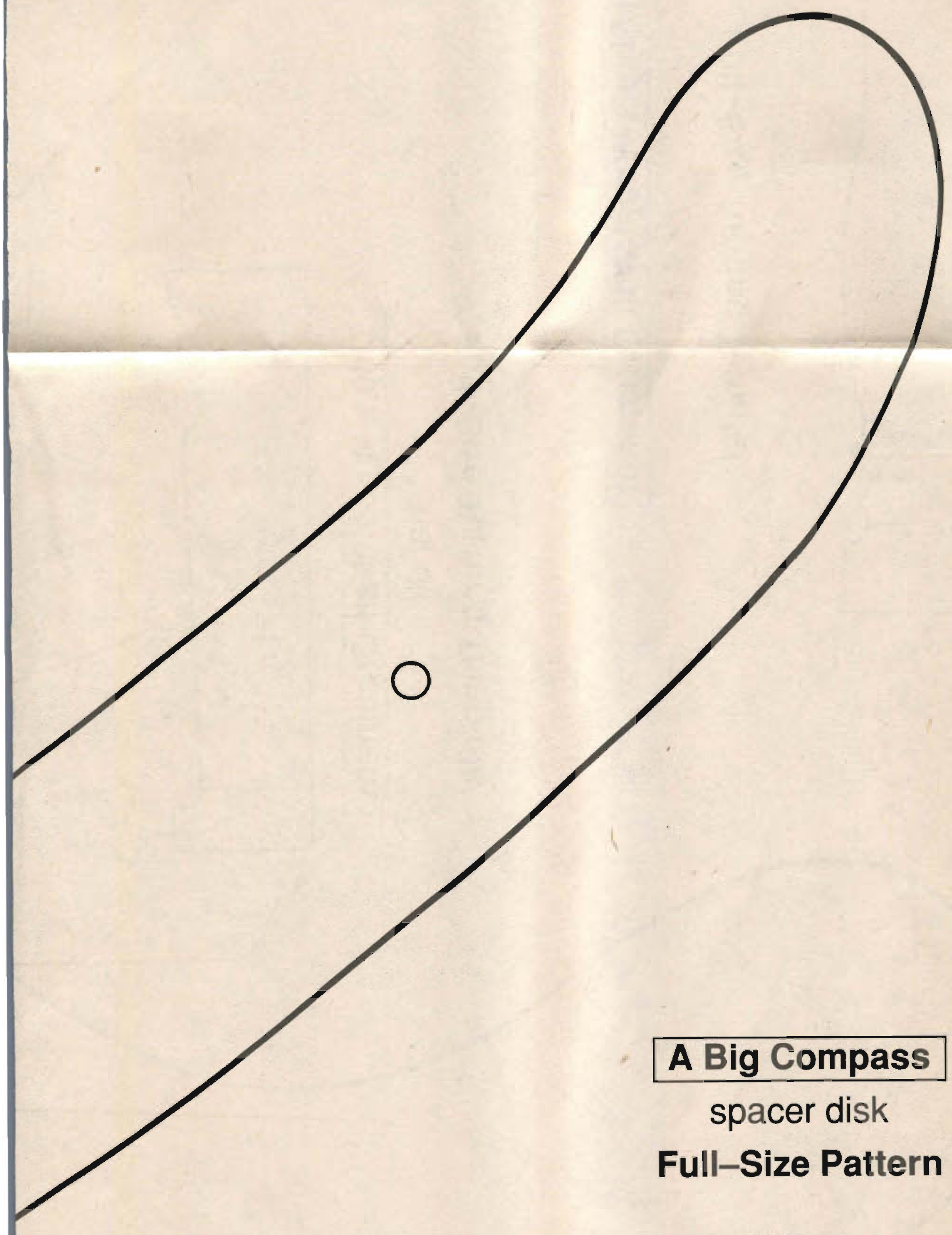
Spindle–Back Arm Chair
top rail
Full–Size Pattern

Spindle–Back Arm Chair
arm template (side view)
Full–Size Pattern

A Big Compass
adjustment arc
Full–Size Pattern







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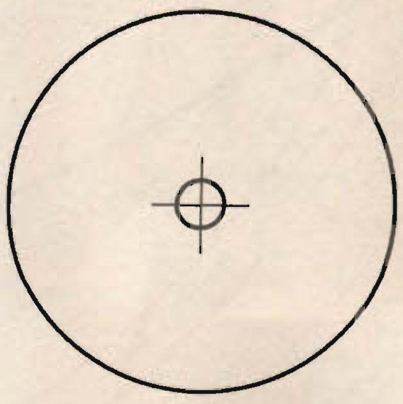
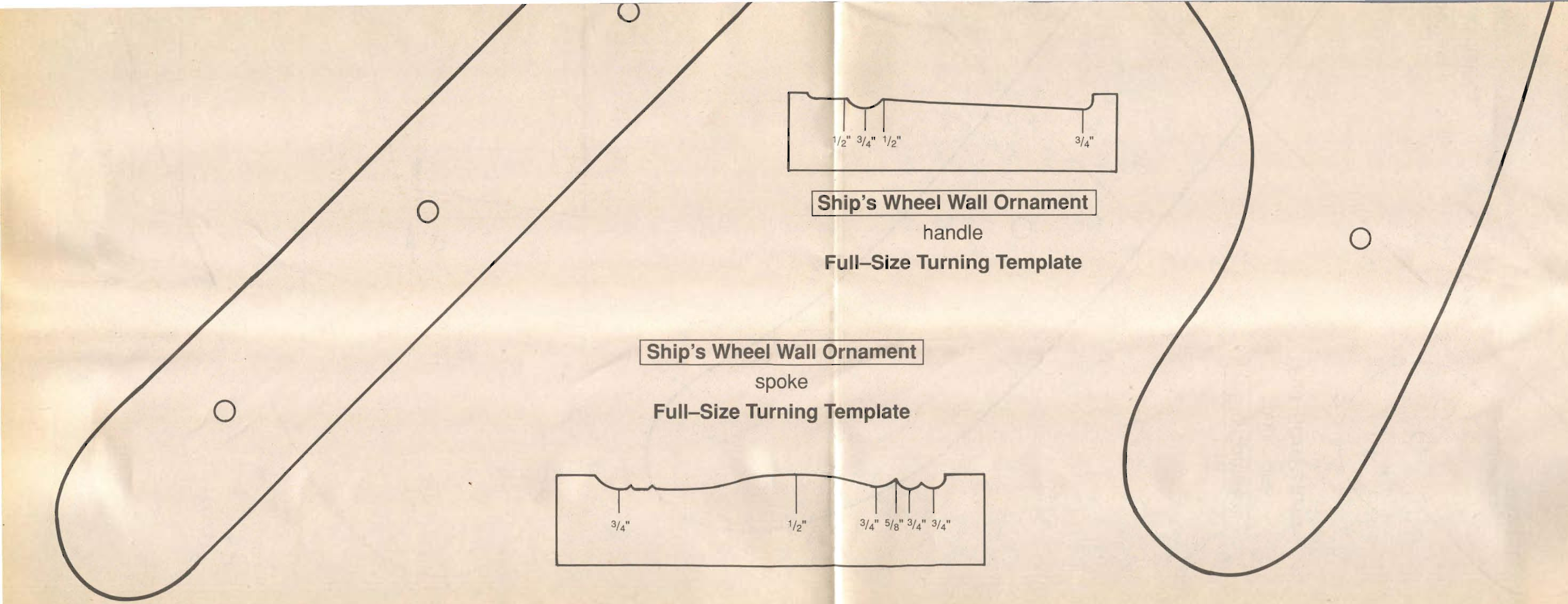
A Big Compass

spacer disk

Full–Size Pattern





Ship's Wheel Wall Ornament

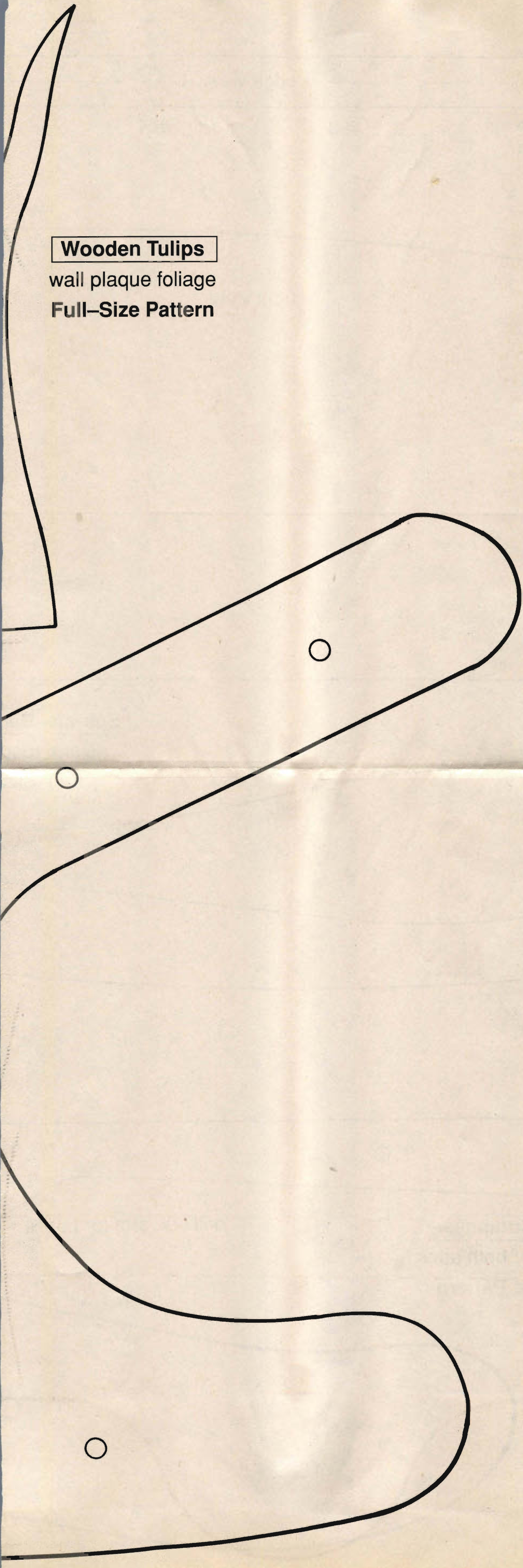
handle

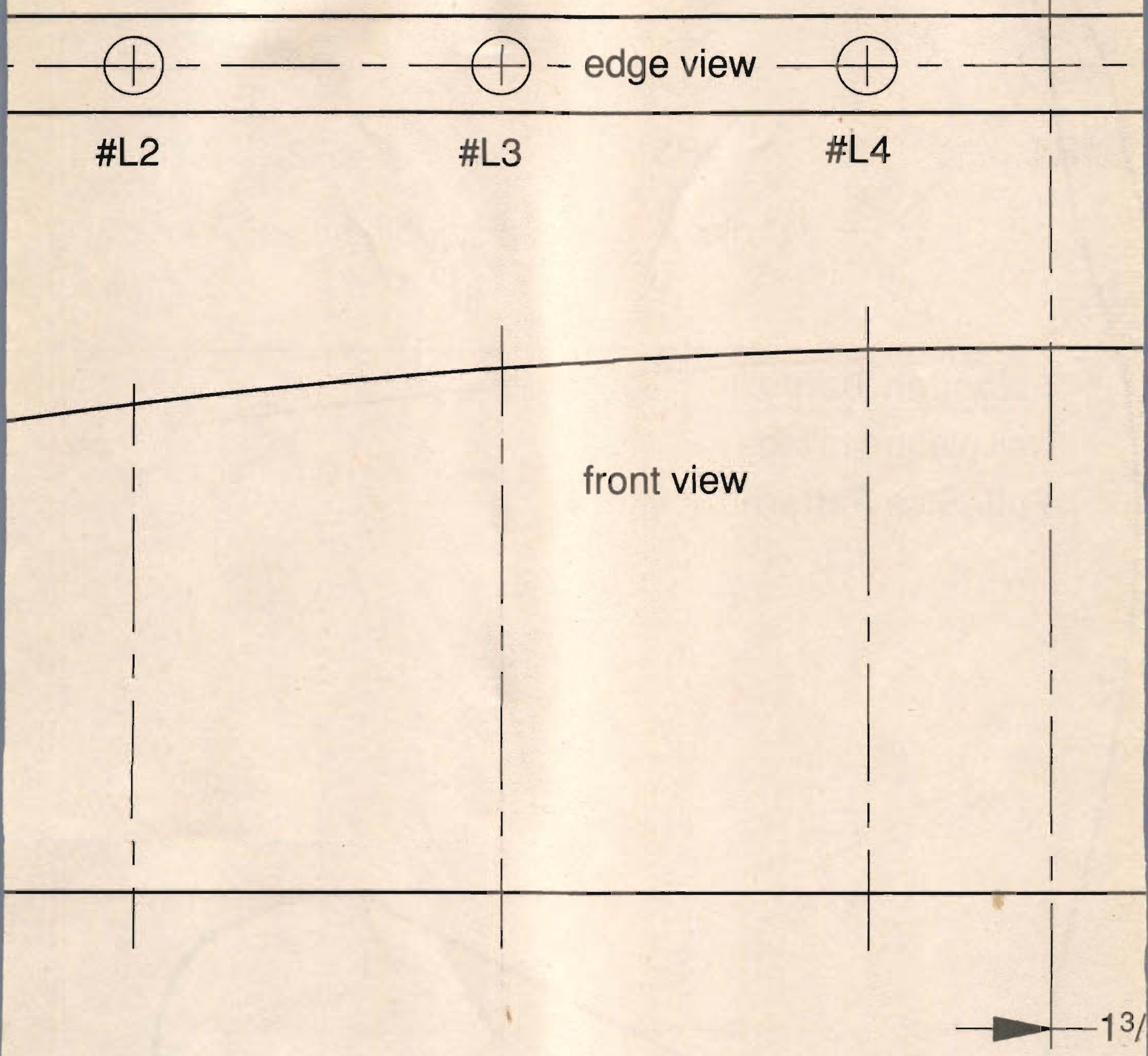
Full–Size Turning Template

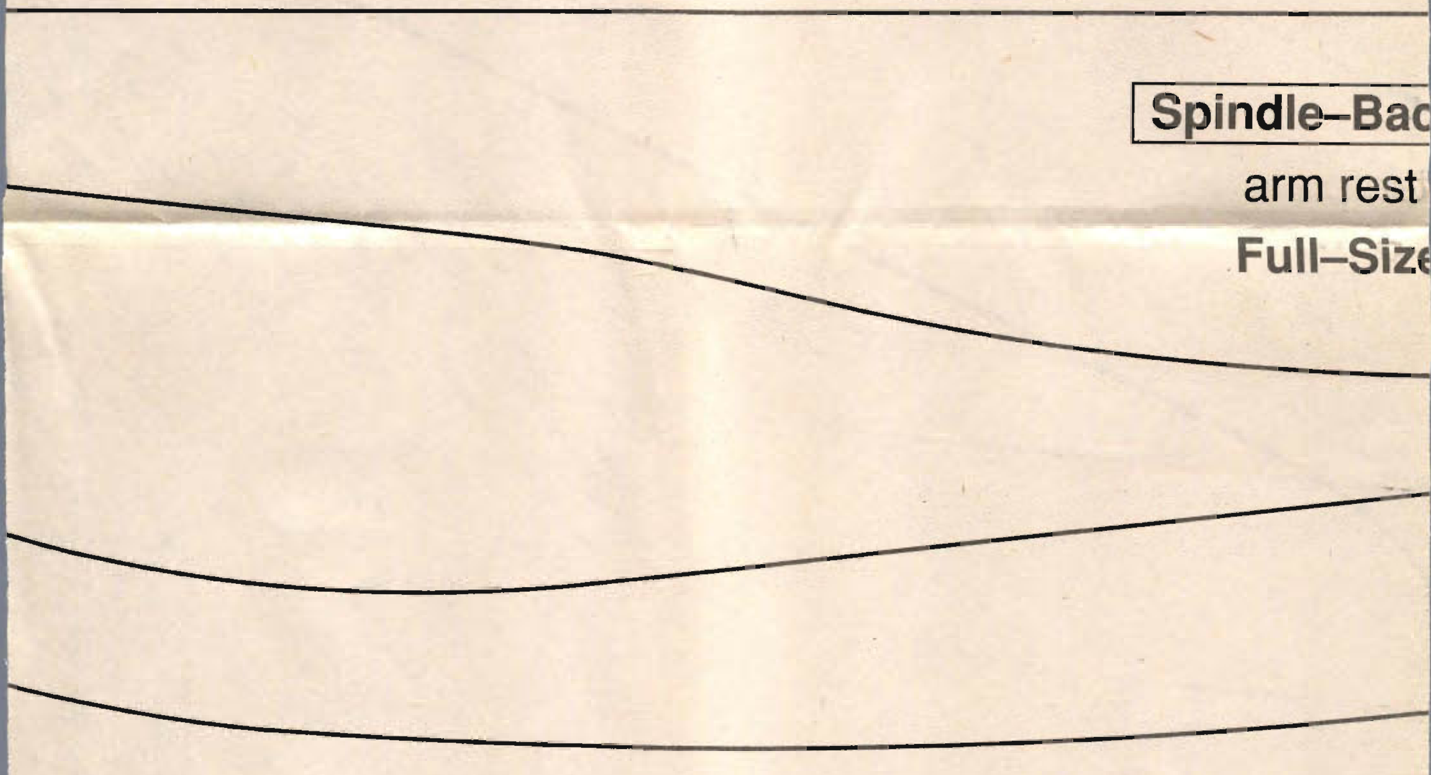
Ship's Wheel Wall Ornament

spoke

Full–Size Turning Template


Wooden Tulips
wall plaque foliage
Full–Size Pattern

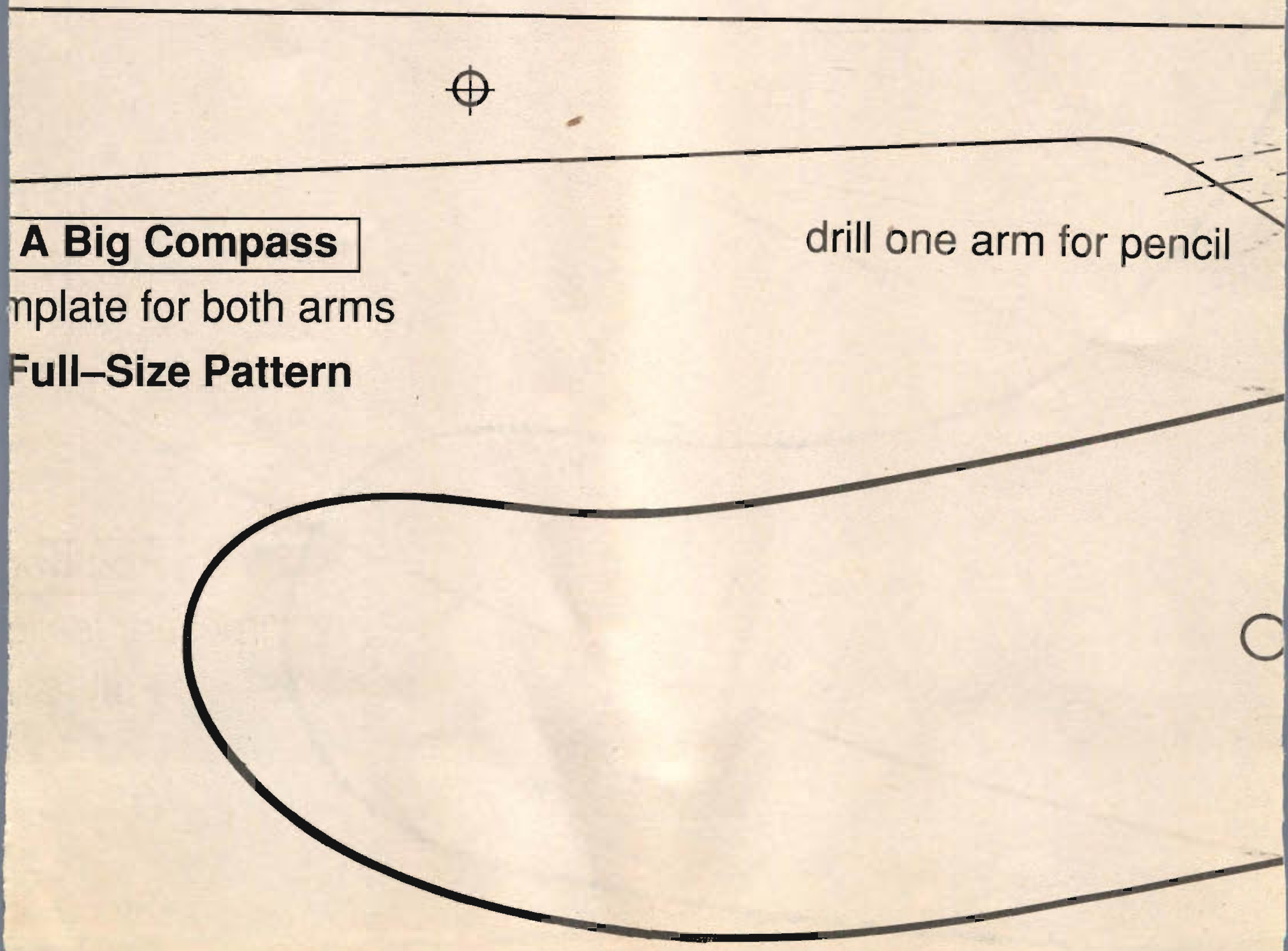




Spindle–Bac

arm rest

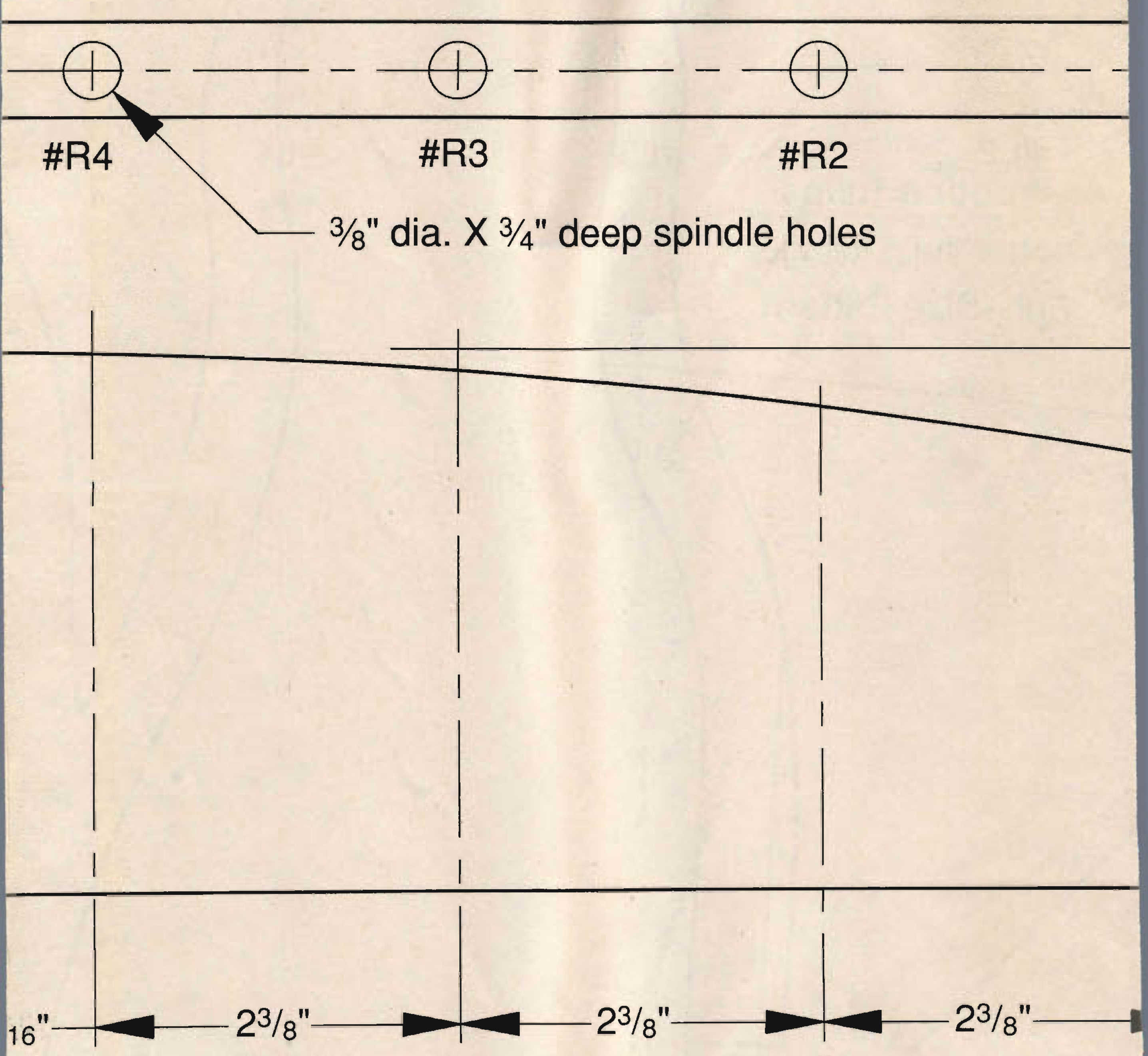
Full–Siz

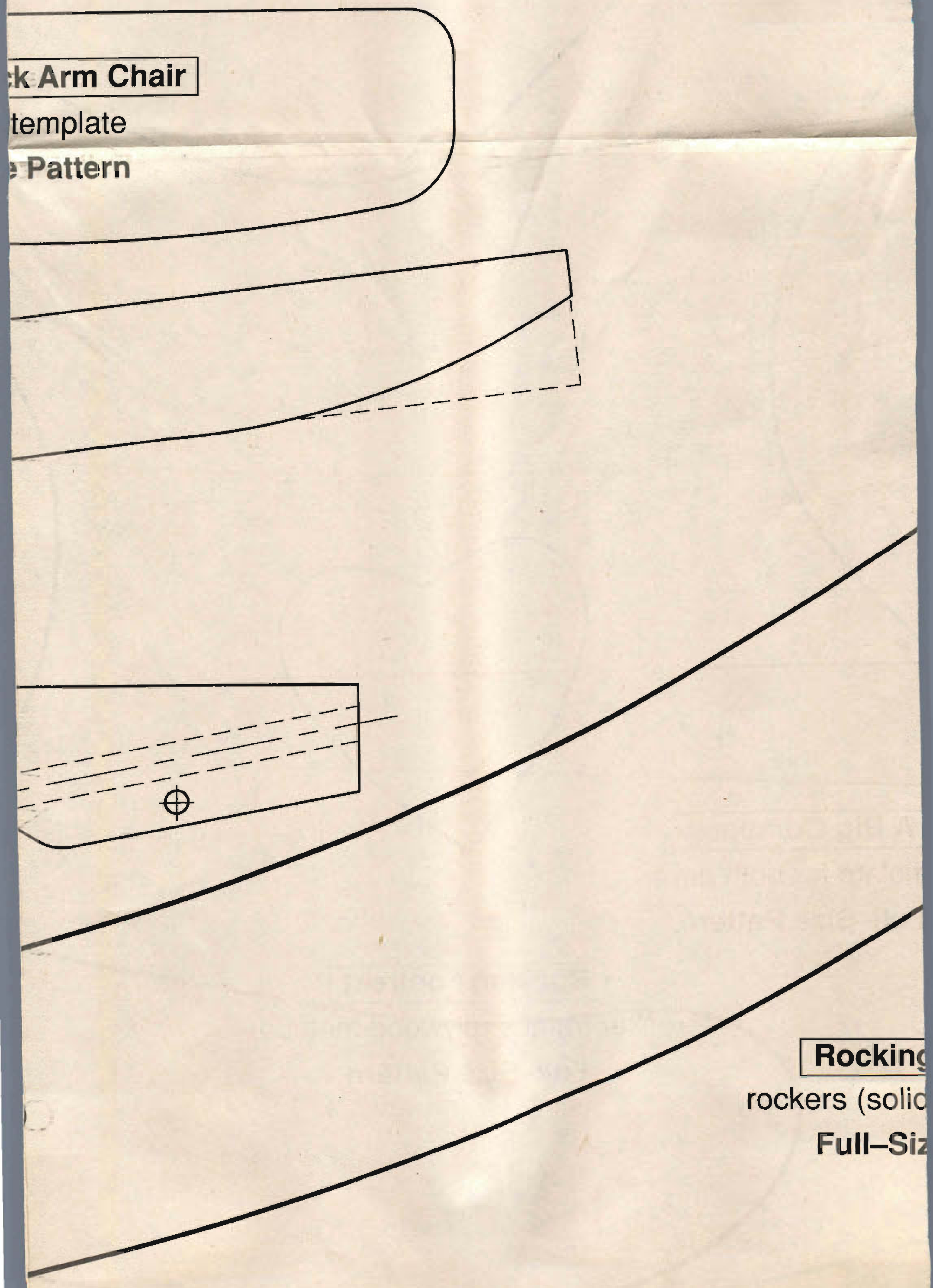


A Big Compass

mplate for both arms

Full–Size Pattern


#R4
#R3
#R2
3/8" dia. X 3/4" deep spindle holes
16"
2 3/8"
2 3/8"
2 3/8"


k Arm Chair
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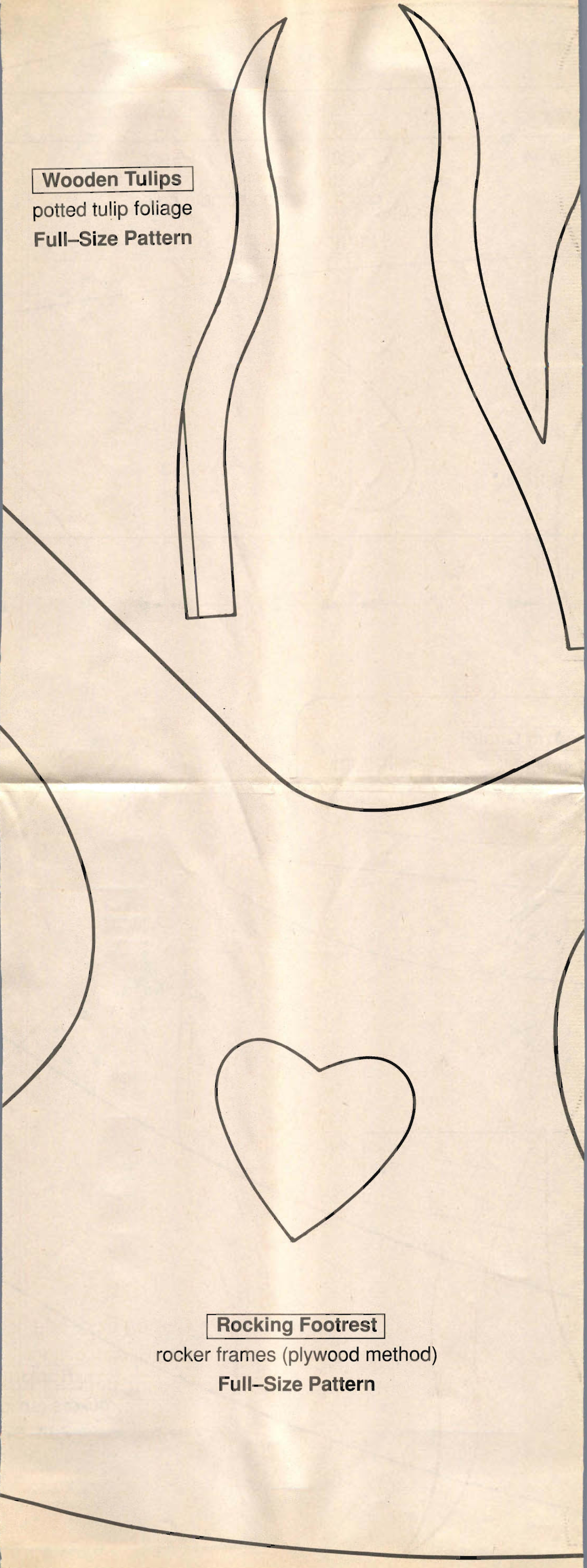
Pattern
Rocking
rockers (soli
Full–Siz



Wooden Tulips

potted tulip foliage

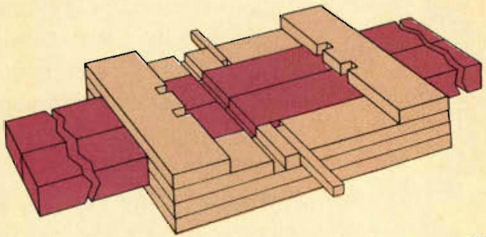
Full–Size Pattern

Rocking Footrest

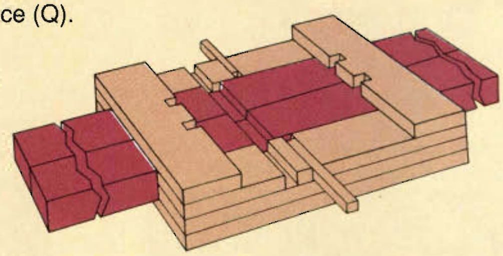
rocker frames (plywood method)

Full–Size Pattern

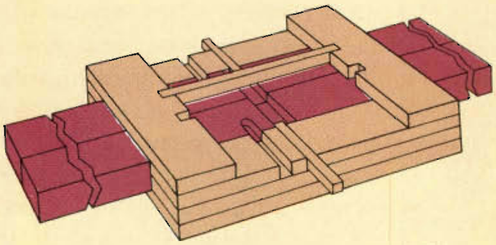
Table Dadoes



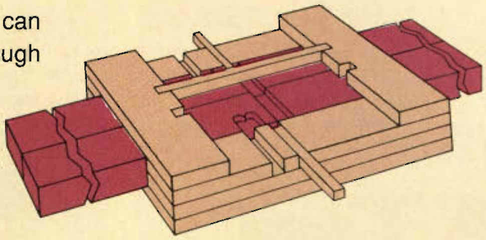
1 Since only the center third of the table sides (O) will receive rib ends, measure out from the center 15¾". Align this mark with the leading edge of the bit slot and make your first pass. Don't use a stop block because you need a full–width cut here for a top brace (Q).



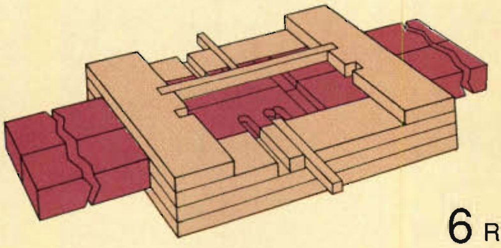
2 Slide the pieces ¾" so that the second pass is directly adjacent to the first, producing a 1½" through dado.



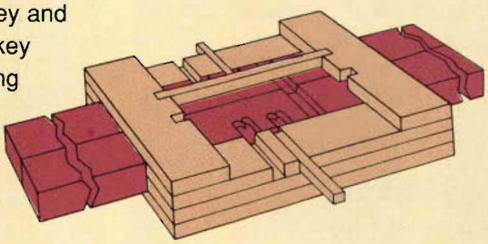
3 Slide the pieces until you can key both the index slots into the through dado. Insert the stop block and make your first pass in cutting the first rib dado (remember that the table ribs are 1½" wide). Move the stop block to the other side and make your first pass in the matching piece.



4 Slide the pieces until you can only key into the second index slot, with the key snug against the through dado's trailing edge. You're now ready, using the stop block, to make the second passes—widening the rib dado to its full 1½".



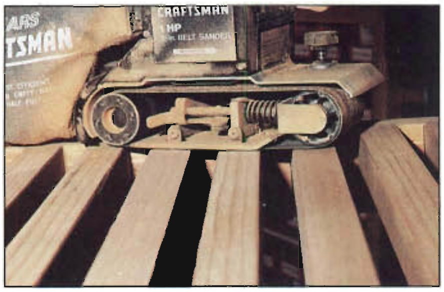
5 Next, slide the pieces until both keys can enter the rib dado, the first key snug against its trailing edge, the second snug against its leading edge. Make the first passes, using the stop block, in cutting the second rib dado.



6 Remove the first index key and slide the pieces. The second key remains in the same dado, but should be positioned against its trailing edge. Now make the second passes to complete the second rib dado.

Repeat the last two steps until you have 11 rib dadoes in addition the first top brace dado. Then cut the second full–width top brace dado. The table ends (P) are simpler, requiring only 13 1½" dadoes, but as Figure 2 shows, the second from each end must be a through dado to receive the 3½" wide leg rib (S).

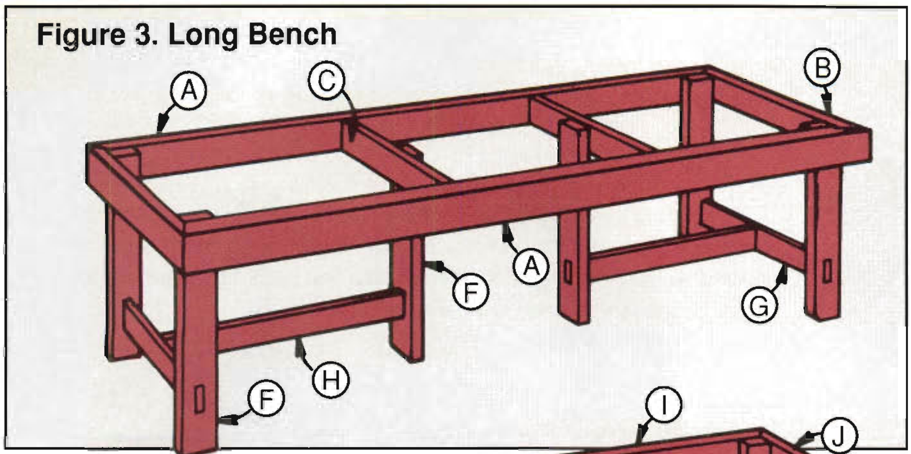
A belt sander quickly removes dried glue and gives the table top an initial smoothing.



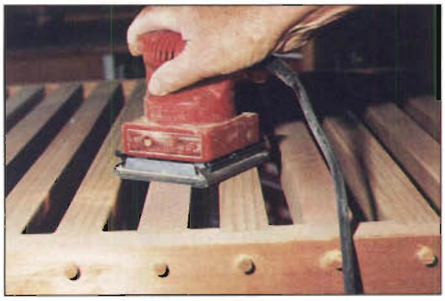
Make plenty of ⅜" redwood plugs to cover all the exposed screw heads.

After the glue has dried, smooth down the plugs with a chisel and a little sanding.

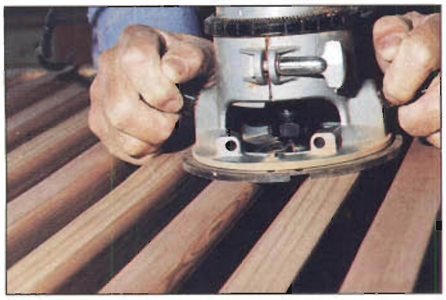
Figure 3. Long Bench



A pad sander or hand sanding smooths the top enough for rounding over the ribs.

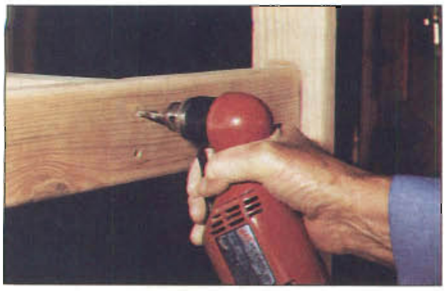


The top must be very smooth so the router won't be deflected. Use a roundover bit to get clean, smooth edges everywhere.



Here's one way of cutting the mortise in the legs—a ½" mortising chisel and bit.

Locate the holes for the threaded inserts in the main brace (W) by drilling through the leg braces (V) with a ¼" bit.



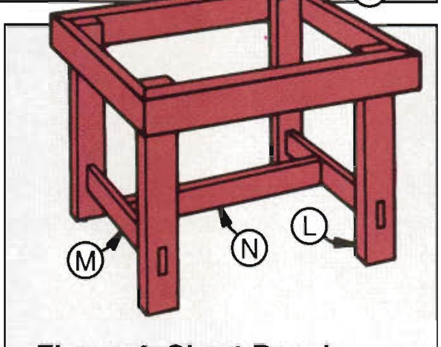
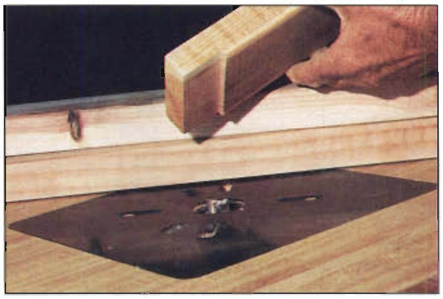


Figure 4. Short Bench

Shape the tongue at the top of the leg by rabbeting both sides ¼" deep (Figure 6).



Hold the drill square when drilling for the bolt that secures the leg to the table.

Drive the threaded inserts into the main brace. I coded the legs and braces to make assembly easier.

Tops Up

Once you've completed the dadoing, measure off the finished lengths on the bench sides, mark the locations of the miters, and make the cuts. Drill holes for #8 X 2½" screws in the sides to secure the ribs in their dadoes, and counterbore ⅜" X ⅜" holes to receive redwood plugs wherever screw heads will be visible.

Assemble the sides and ends first; corner clamps will secure the miter joints at 90° while you prepare to glue and screw them. Then glue in the top braces and ribs, and secure them with non–rusting polymer coated screws. The screwed joints won't need clamping, but be sure to coat both surfaces with waterproof glue. The usual white or yellow shop glues will not hold up. Epoxy–type glues are waterproof, very strong and will fill small defects.

The ⅜" plugs can be cut from scrap redwood with a plug cutter and glued. Trim them with a chisel, fill any defects with a mixture of redwood sawdust and glue.

After sanding all surfaces smooth, use a ⅜" roundover bit to round all corners, edges and between each of the ribs.

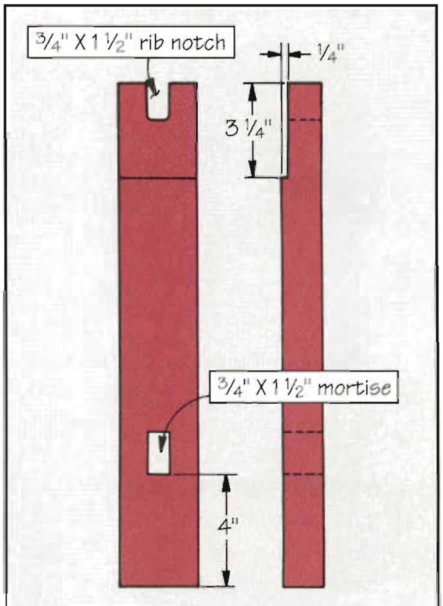
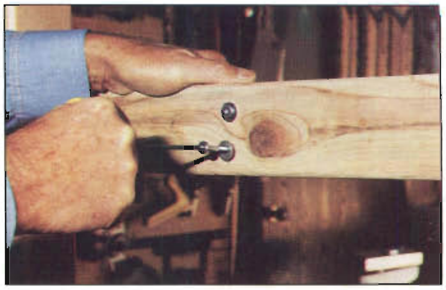


Figure 5. Bench Legs

Screw ¼" bolts into the threaded inserts to hold the leg braces (V) securely to the main brace.



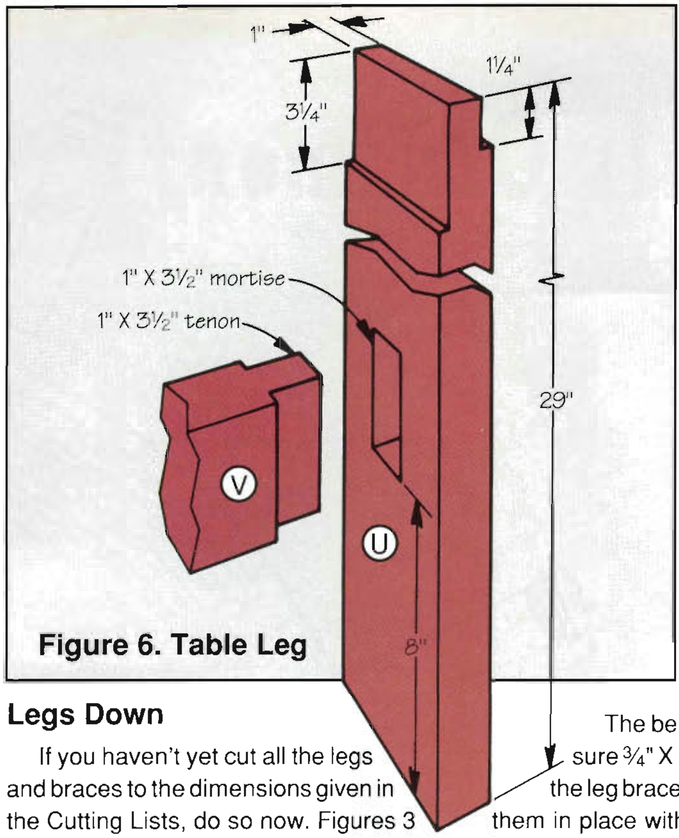


Figure 6. Table Leg

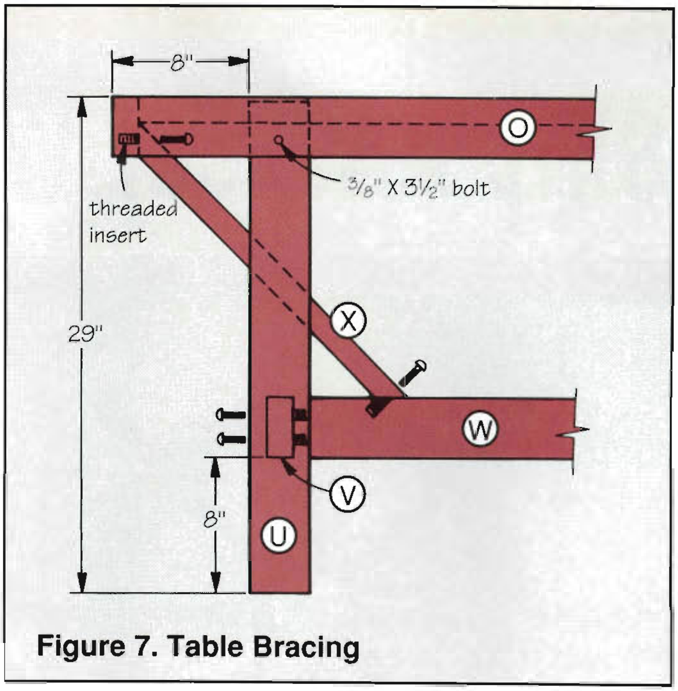
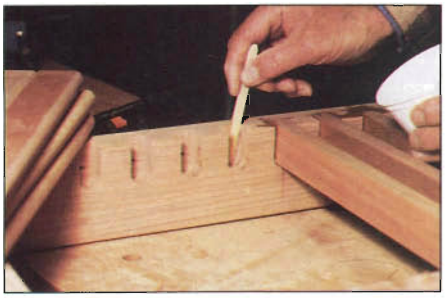


Figure 7. Table Bracing

Legs Down

If you haven't yet cut all the legs and braces to the dimensions given in the Cutting Lists, do so now. Figures 3 and 4 illustrate the bench designs. The six legs for the long bench (F) and the four for the short bench (L) are all rabbeted, notched and mortised as shown in Figure 5. Mount dado blades on the table saw and cut a ¼" deep X 3¼" wide rabbet across the upper end of each. When the leg is in position, the last rib will sit in the notch and the bottom edge of the bench side will rest on the shoulder of the rabbet.

An ice cream stick really gets the glue deep into the dadoes.



The notch at the top of the bench legs locks into the ribs—cut it on the router table using a fence and stop block.

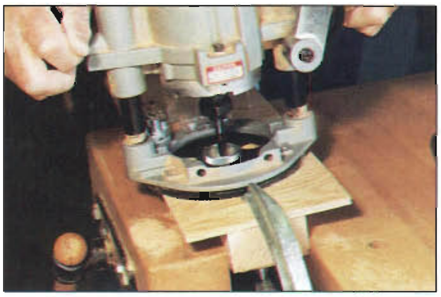
The bench leg mortises measure ¾" X 1½" in order to receive the leg braces (G, H and N). Secure them in place with waterproof glue and two #8 X 3" screws through the sides of the legs and into the braces. Where a lengthwise leg brace (H and N) meets a crosswise brace (G and M), a glued and screwed butt joint will suffice.

The table legs (U) are rabbeted on both sides to form a tongue that will fit snugly in the 1" wide rib spaces. Dimension as shown in Figure 6 so that the shoulders will be at the right height to butt up against a 1½" wide rib (R) on one side and a 3½" wide leg rib (S) on the other but still be below the surface of the top. You'll also need to rabbet both ends of each leg brace (V) to form 1" X 3½" tenons. Finally, shape the main brace (W) and angle braces (X) as shown in Figure 7. Round all sharp edges on legs and braces with your router.

The table legs are designed to be removed for winter storage, and are held in place with a countersunk ⅜" X 3½" bolt, two flat washers and a nut. The main brace and angle braces are attached using ¼" X 20 threaded inserts so they can be removed, too (Figure 7). If you don't need the disassembly option, use ¼" X 3" lag screws with a flat washer under the head.

Whatever finish you select should be able to withstand sun and rain. Be certain to finish all surfaces, including the under surfaces that don't show and those under the take–apart leg and brace joints. The benches store easily with fixed legs and can be finished after the legs are attached. Give everything a fresh coat of finish each spring. PW

A plunge router makes short work of the mortise in the bench legs.

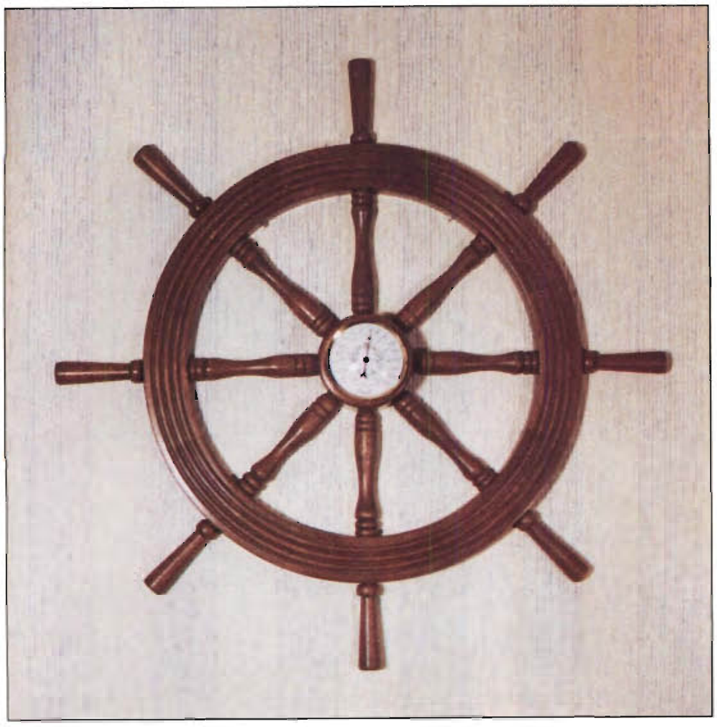


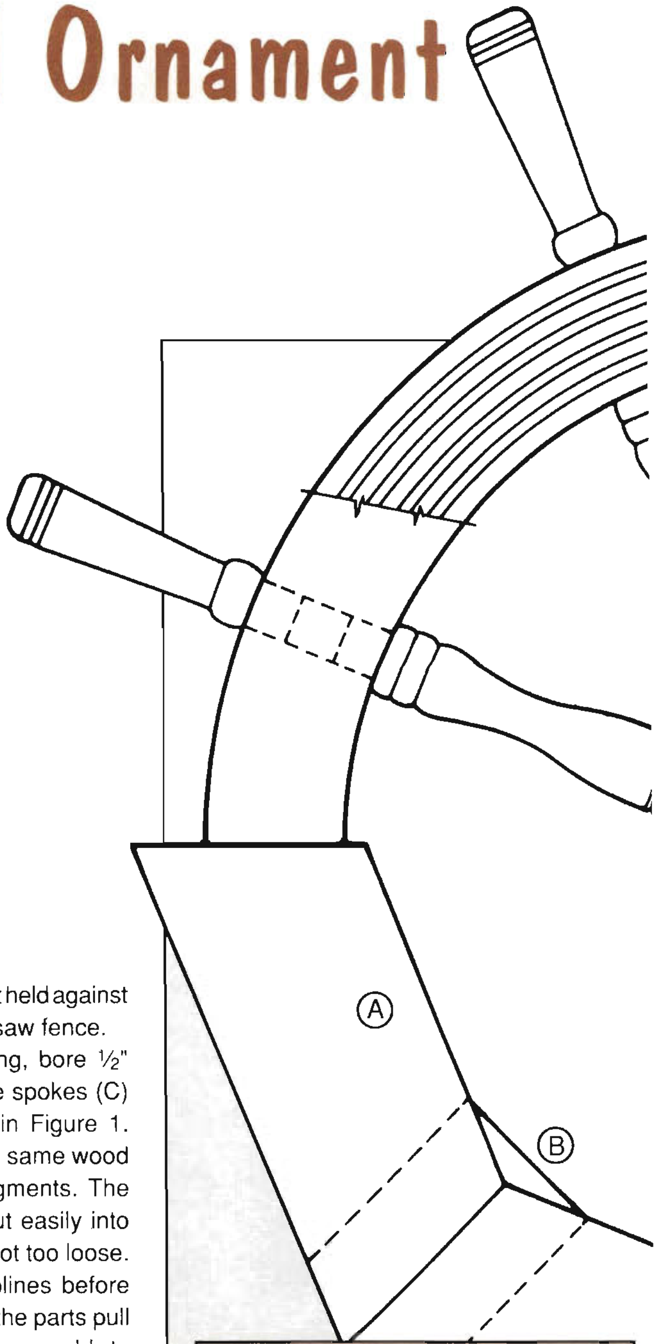
To be sure the space between the top and bottom of the legs is the same, insert a spacer block as you glue up.

A foam brush works well to get the finish between the ribs.

A Popular Woodworking Project

Ship's Wheel Wall Ornament





by Devore O. Burch

Here is an unusual wall ornament which also serves a useful purpose when a thermometer, barometer or hygrometer is installed in the central hub. This project is primarily a lathe job, but you'll need to make a segmented ring from which to turn the ring assembly. I used Honduras mahogany for the wheel shown here; it's the most commonly used wood for ship's wheels, but they're also made from oak, walnut, teak and other fine hardwoods.

Segmented Ring

Start construction by sawing the eight ring segments (A) as shown in Figure 1. To cut the ¼" slots for the splines (B) in the ends of the ring segments, make a simple table saw jig. You'll need to cut one end of a piece of scrap at the same 22½° angle the ring segments are cut at. As the photo at the top of the next page shows, this piece is screwed to a board, and the assembly—with the ring segment held against the board—slides along the saw fence.

Before assembling the ring, bore ½" holes in the segments for the spokes (C) and handles (D) as shown in Figure 1. Then cut the splines from the same wood you're using for the ring segments. The splines should slip snugly but easily into their slots, not too tight and not too loose. Dry fit the segments and splines before applying glue. Make sure all the parts pull together tightly. I clamped the assembly to a flat piece of particle board while gluing to assure flatness. For clamping the segmented ring, a band clamp works fine, or if you prefer, use a length of wire around the outside diameter and twist the ends to tighten up the assembly. Allow the glue to dry overnight.

After the glue is dry, rough saw the ring to the dimensions shown in Figure 1. The most accurate and efficient way to achieve the final shape is by lathe turning. Figure 2 shows a simple turning fixture you can make. Screw through the plywood and into the back of the ring, being careful not to

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***Devore O. Burch** is a woodworker in Fort Worth, Texas and a frequent contributor to* Popular Woodworking.

Ship's Wheel Cutting List

Qty	Part	Finished Size T	W	L	Piece
8	A	¾"	2½"	6½"	ring segments
8	B	¼"	2"	3¼"	splines
8	C	1"	1"	7"	spoke blanks
8	D	1"	1"	5"	handle blanks
1	E	⅜"	3½"	3½"	hub back
1	F	1"*	3½"	3½"	instrument case

*adjust to fit instrument

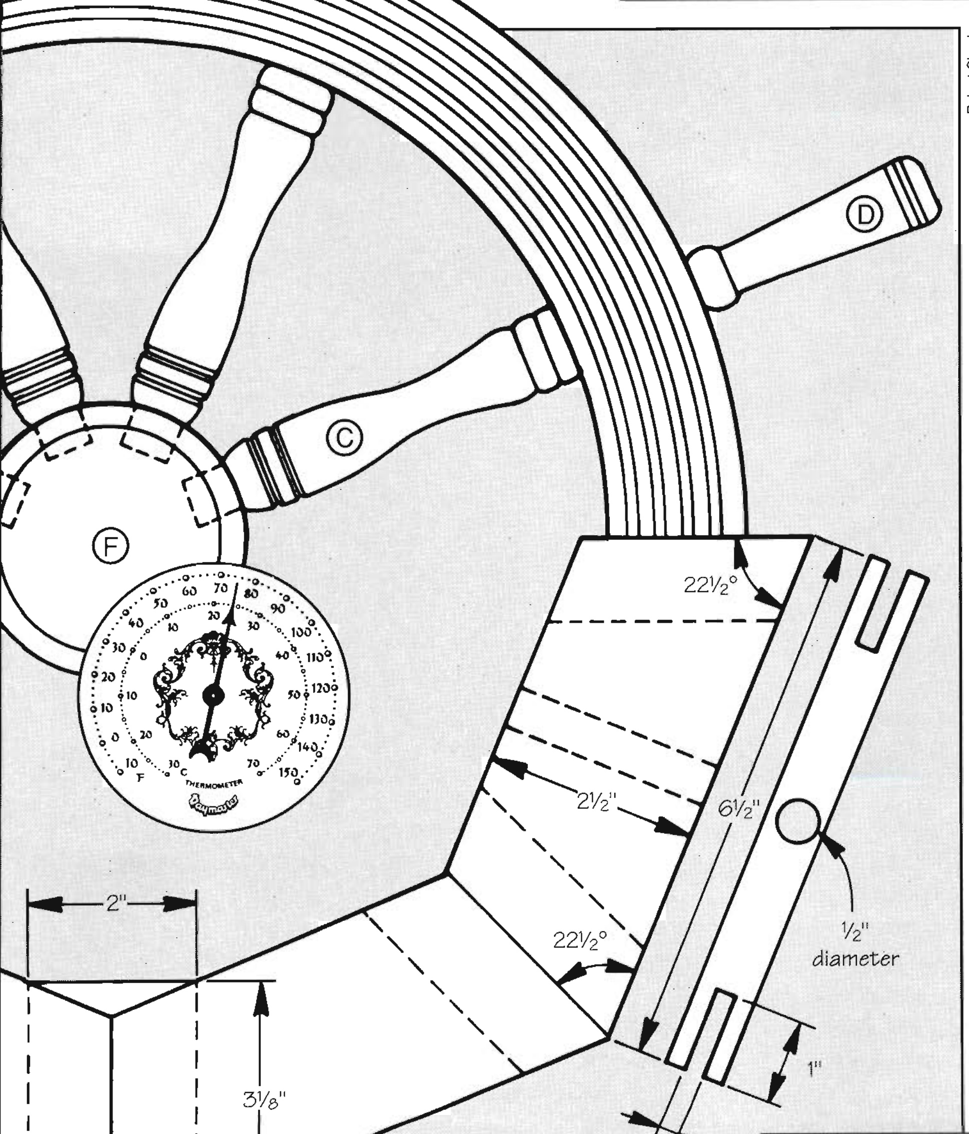
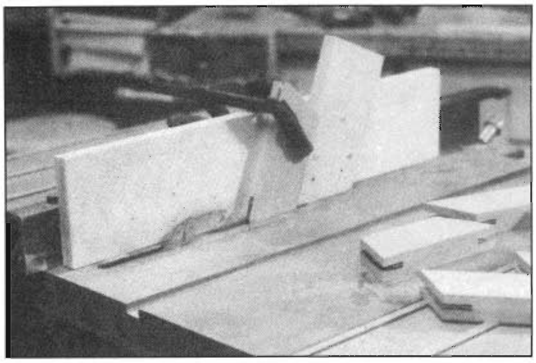
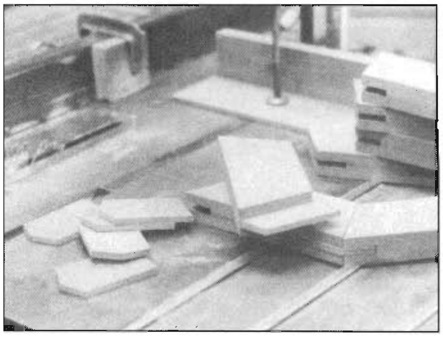


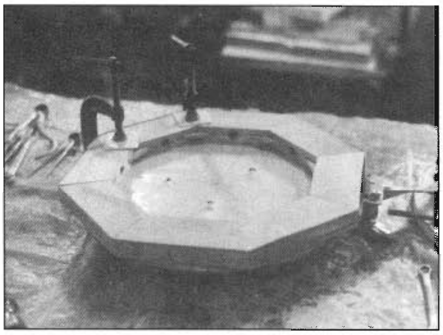
Figure 1. Composite View

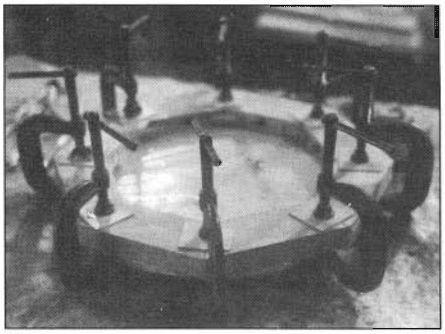


I made a sliding auxiliary fence with an angled block to cut the spline slots in the ring segments.

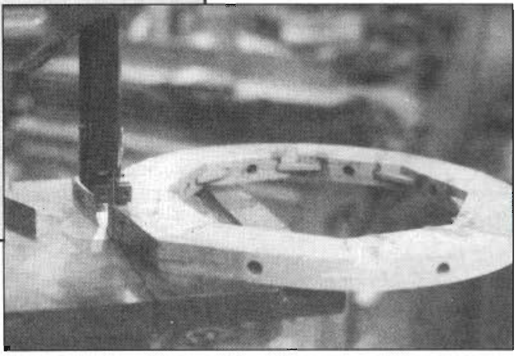


Robert Chapla

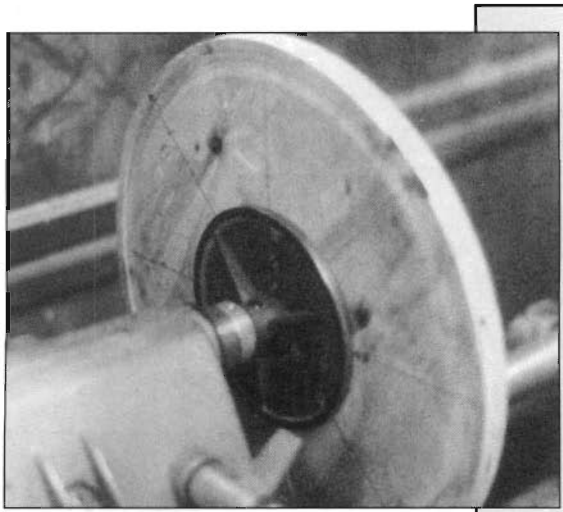




A band clamp runs around the edge of the ring. Clamps at every spline joint secure it to the turning fixture. Wax paper keeps it from sticking.

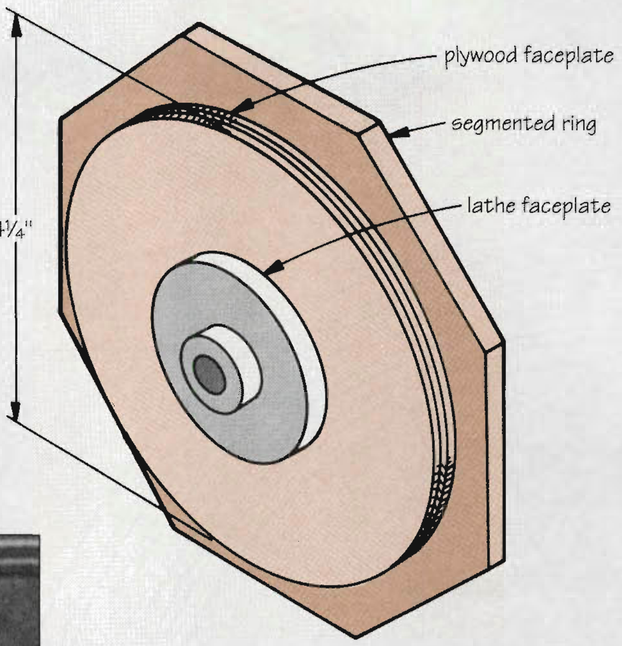


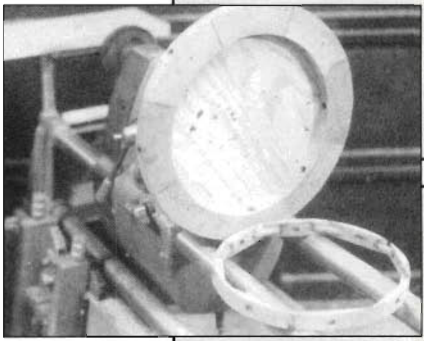
When the glue is thoroughly dry, bandsaw the perimeter of the ring before turning.



Here's the lathe fixture for turning the ring. Below, the ring is mounted and ready for turning. Note the bandsawn waste.

Figure 2. Lathe Turning Fixture

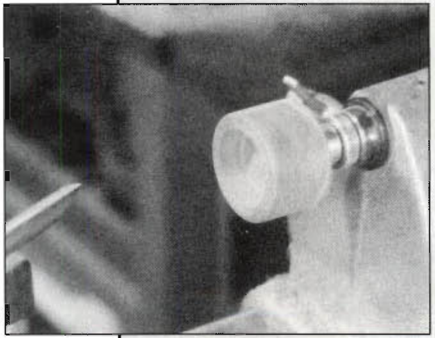


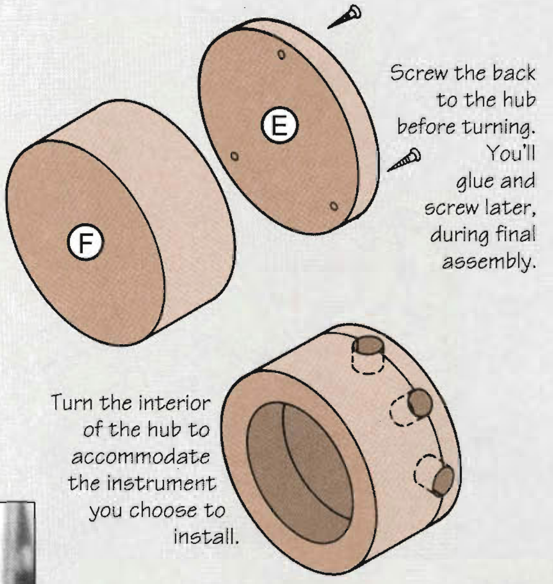


penetrate more than ⅔ the thickness of the ring. You don't want to risk hitting the screw tips with the cutter when turning the beading on the face of the ring. I used a three–bead moulding head cutter attached to a shopmade handle (to turn moulding cutters into turning tools, see the Jig Journal on page 61). You can modify or omit this detailing as you wish. The shaping of the segmented ring is now complete.

Hub

The central hub consists of a back piece (E) and the instrument case (F), shown in Figure 3. Screw the two pieces together with three #4 flat head wood screws flush against the back side. You'll apply glue later, during final assembly. With the two pieces attached securely, you can turn the hub assembly on a small faceplate. Turn the recess in the instrument housing to fit the instrument you plan to install. You can purchase thermometers, barometers and hygrometers from many hardware stores and mail order suppliers, including Constantine's (2050 Eastchester Road, Bronx, NY 10461. Tel. 1-800-223-8087).

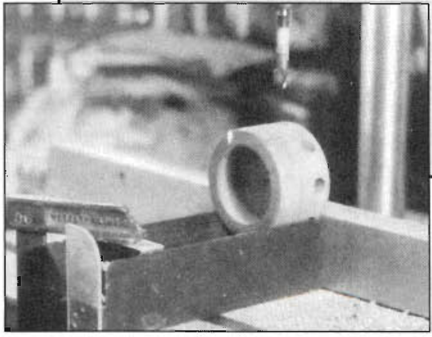




Screw the back to the hub before turning. You'll glue and screw later, during final assembly.

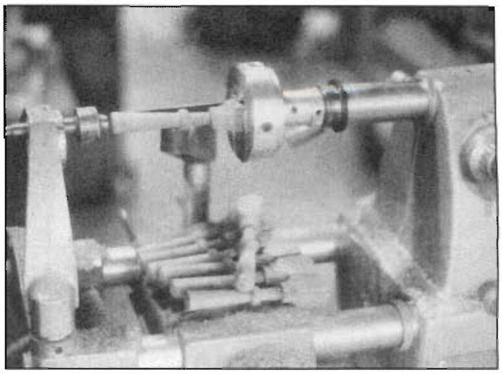
Turn the interior of the hub to accommodate the instrument you choose to install.

Figure 3. Hub Assembly



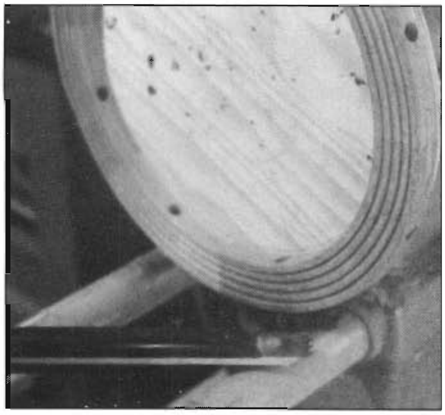
In the center photo above, the hub has been mounted on the faceplate and turned. I held the hub assembly in a V–block while boring the spoke holes in it.

Next, sand the hub assembly starting with 80-grit paper and working through 320-grit. Now remove the hub assembly from the lathe and bore the eight equally



author

To the right, the last handle is being turned. I checked their progress frequently with the full-size template provided in the PullOut™ Plans.



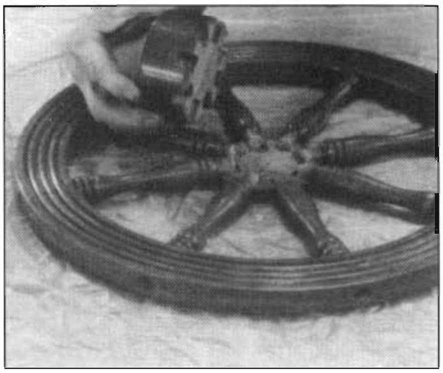
spaced ½" holes in the hub for the spokes as shown in Figures 1 and 3.

The spokes and handles are simple spindles and require no special operations. Turn them between centers using the full–size templates in the PullOut™ Plans as gauges for making them all similar. Since these parts are all lathe turned, I find it an advantage to finish them in the lathe before assembly. This is a matter of choice. I began with a coat of red mahogany NGR (Non–Grain–Raising) stain, thinned three to one and followed by a coat of natural paste wood filler. When dry, polish with #0000 steel wool. I then applied two coats of sanding sealer and two coats of Deft® Brushing Lacquer, polishing with #0000 steel wool between coats. I finished up by rubbing with pumice, rottenstone and wax.

Assembly

Dry fit everything before applying glue. Put the spokes into the ring assembly and into the hub back. Then fit the instrument case over the spokes and against the hub back. When you're satisfied with the fit, apply glue and repeat the assembly procedure. Then attach the handles and install the instrument, and the ship's wheel is ready to grace your wall. PW

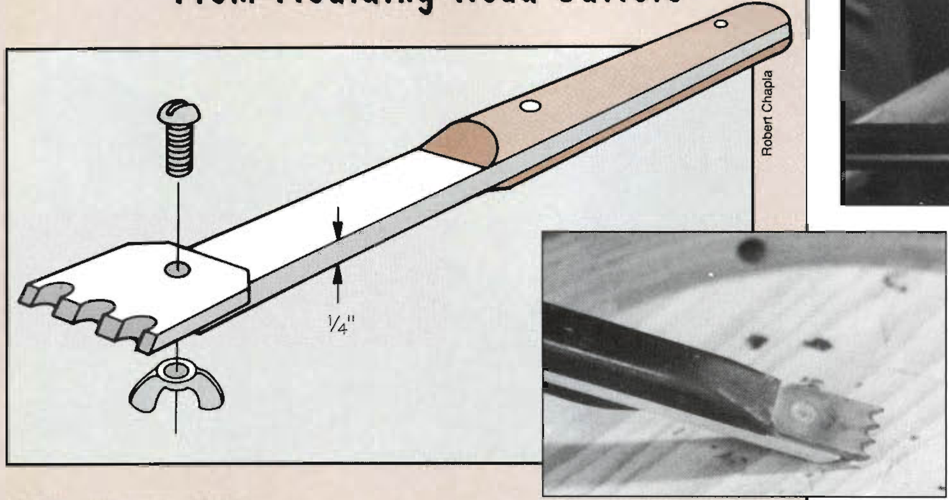
Finishing the spokes is quick and easy while they're still mounted on the lathe.



After finishing the hub case and back, fit the spoke ends into the holes, apply glue, and screw the case to the front of the assembly through the pre–drilled holes in the back.

Jig Journal

Make Your Own Lathe Tools From Moulding Head Cutters



Robert Chapla

by Don Kinnaman

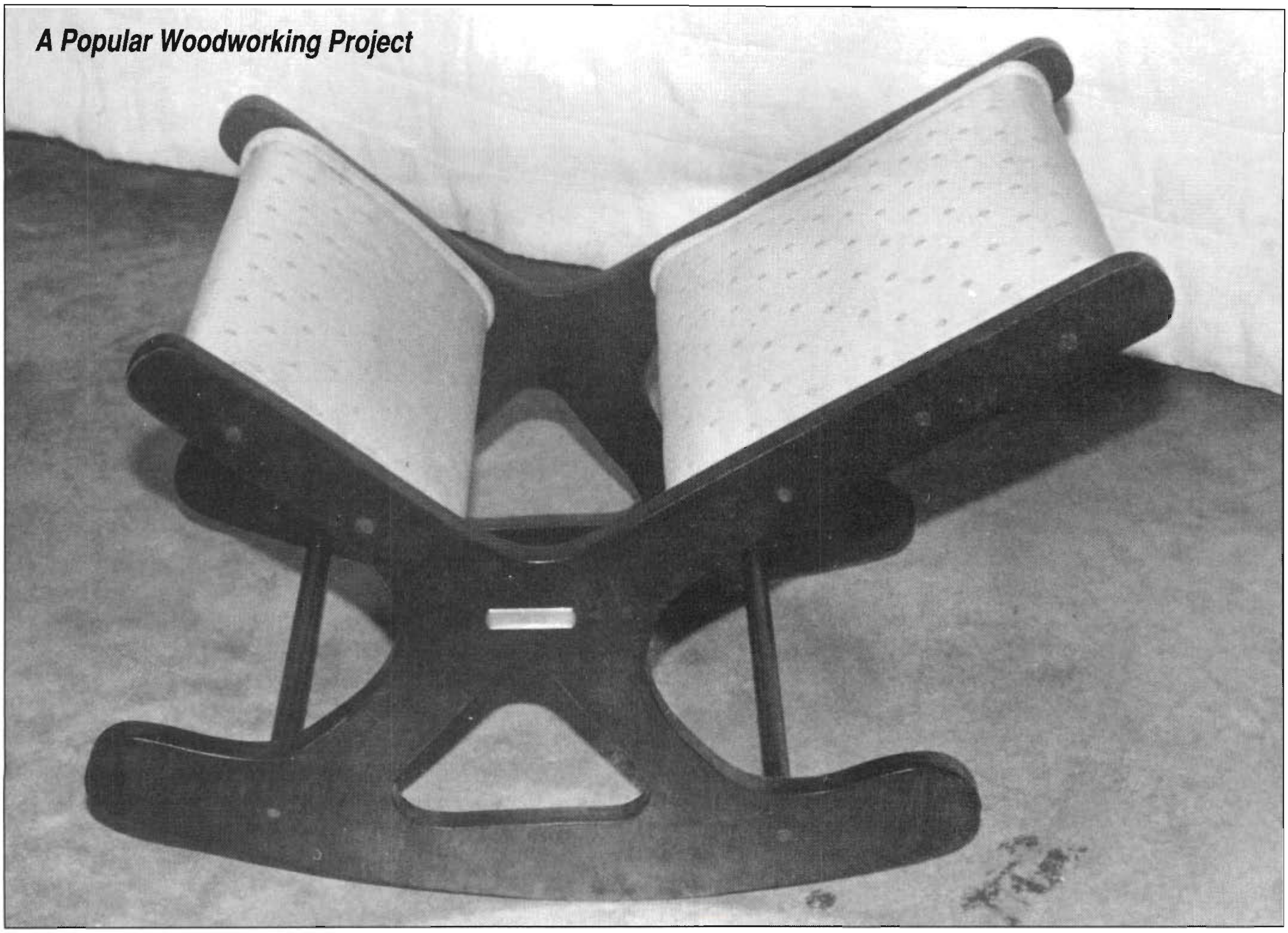
Here's a tool that really comes in handy for making duplicate or custom turnings—like the beading on the ship's wheel wall ornament. You'll need any single bit moulding head cutter of the type designed for the table or radial arm saw. Special bits can be ground from blanks for special production–type turnings like flanged railroad wheels for toy trains.

Start with a bar of cold rolled steel ¼" X 1" X 18" for the handle. Aluminum stock may work, but it probably should be ½" thick for strength. Hack saw, grind or file a small rabbet across one end to accept the cutter bit. Carefully position a hole in this section to accommodate the moulding blade, and drill it to match the one in the body of the cutter. You may want to drill this hole slightly smaller than the bit hole and then tap a thread into it, rather than use a wing nut and lock washer.

Using a V–block to hold it in line with your band saw blade, slice a 1" X 12" dowel into two equal halves. Round off the ends so they're comfortable and attach the dowel halves to the steel shank with epoxy or silicone. Drill a pair of holes through your new tool handle to receive soft iron rivets. A cut–off spike will also work, since nail metal is usually soft enough to be peened flat on the opposite side. Or you can use a stove bolt and nut—just be sure to counterbore the handle so the bolt head and nut don't protrude above the handle surface. PW

***Don Kinnaman** is a retired high school woodshop teacher from Phoenix, Arizona and a frequent contributor to* Popular Woodworking.

A Popular Woodworking Project



author

A Rocking Footrest

by Jack Hoyt

This unique piece of furniture will confuse people; most will think it is a child's rocker, but it's a reproduction of an antique footrest. The design originated in England where gout was a common ailment in pre-Colonial days. Swollen, tender feet necessitated the invention of something beyond the basic ottoman.

This piece is really quite comfortable and has several advantages over conventional footrests. It rests the feet, and at the same time supports the calves of the legs, relieving the stress on the knees. You might say it converts any chair into a recliner, and because it rocks, it automatically adjusts to your seating position.

There are many ways to construct this piece, each with advantages and disadvantages. We'll discuss several methods; the approach you take will depend on how much effort you want to put into the project and how you want it to look when you're done.

I prefer the simple approach. I cut out the rocker frames from a pair of 3/4" X 17" X 24" panels (see the PullOut™ Plans section in the center of the magazine for full–size patterns). You can use A/B plywood, or you could go the more expensive route and glue up panels of solid wood.

After cutting out the basic shape, you can make a heart shaped cutout or some other decorative design near the base of the rocker frames.

Lay out the hole centers as indicated on the pattern. Countersink for the screws that attach the leg rest (A) and foot rest (B) pieces to the rocker frames, or counterbore for these screws and cover them with wood plugs.

Use a 5/8" Forstner bit to bore stopped holes on the inside of the frames to accept the stringers (C). Set the depth stop on your drill press to bore halfway into the thickness of your material. Use 5/8" dowel stock for the stringers.

Cut the leg rest and foot rest to size according to the Cutting List. Use the same wood as your rocker frames if you don't intend to upholster them. If you will upholster them, make them from pine or whatever is handy and cheap.

This piece is easy to upholster. Cut some padding (carpet padding works well) to 13" wide and use a staple gun to attach

Jack Hoyt is a hobbyist woodworker in Arlington, Texas.

Rocking Footrest

Cutting List

Qty	Part	Finished Size			Piece
		T	W	L	
1	A	3/4"	11 1/4"	13"	leg rest
1	B	3/4"	7 1/2"	13"	foot rest
2	C	5/8" dowel		13 3/4"	stringers

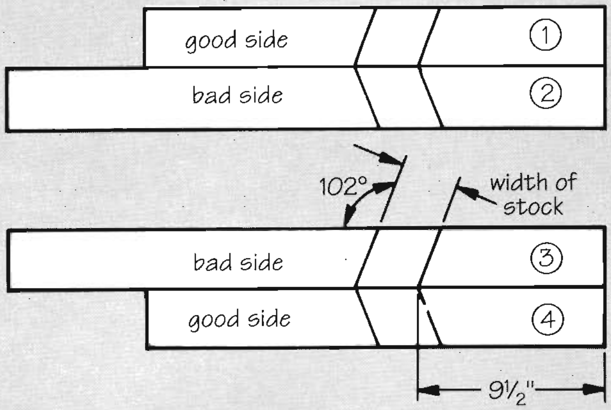


Figure 1. Laying Out the Crosspieces

Robert Chapla

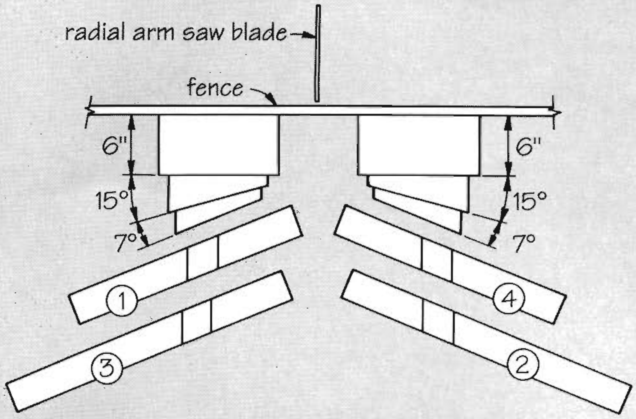


Figure 2. Cutting the Dadoes

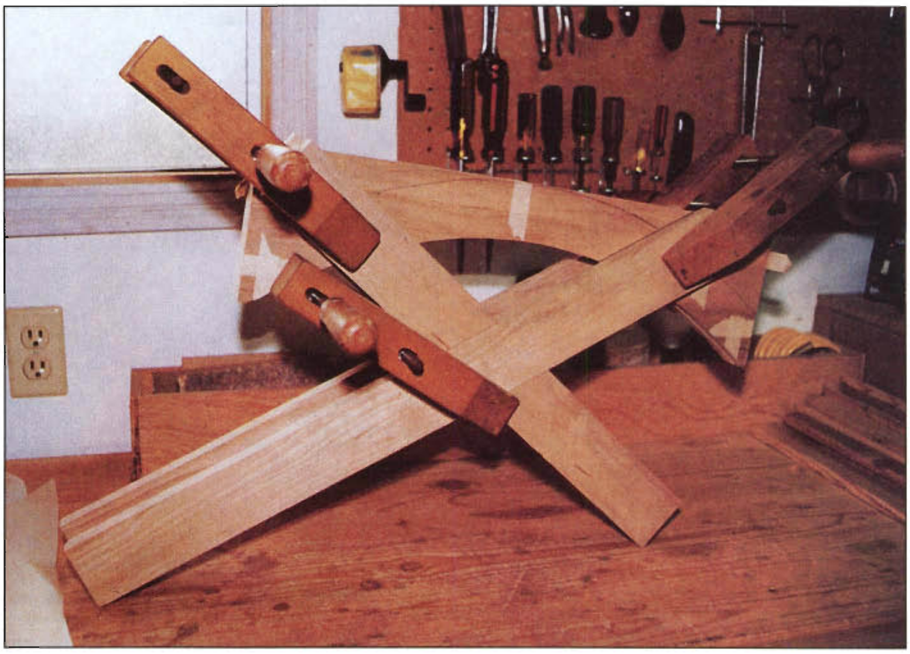
one end to the back of the leg rest. Wrap the padding over the top, down the front, around the bottom and up the back, cut it off even with the stapled end, and staple it in place. Do the same with your vinyl or fabric, folding the edges under and affixing them with hot glue. You can dress up fabric by using welting around the edges. Most upholstery shops will make the welting for a modest price if you furnish the fabric.

Finish the parts before assembly with whatever you prefer. If you used plywood for the rocker frames you'll probably want to apply iron–on edge–banding which brings up the reason for a more involved approach to making the rocker frames. Solid wood construction makes for a nicer piece of furniture. Earlier I mentioned cutting the frames from a glued–up panel. This wastes a lot of wood and works contrary to its natural strengths.

In early versions of this piece the rocker frames were made of three boards joined together. After joining the boards, the shape of the frame can be sawn to a more refined form at the whim of the maker.

Start by ripping some hardwood stock 2½" to 3" in width. You'll need two pieces that are 30" long and two that are 23" long. For the rockers you'll need two pieces that are 5" X 22".

These pieces will be joined with lap joints, angled dadoes that interlock such that the pieces are flush to each other. Determine which surfaces of each piece should face outward and lay them out in pairs as shown in Figure 1. Set a sliding T–bevel to 112° and mark the dadoes sized to the width of your stock. Cut the dadoes leaving the line, in whatever manner you prefer (router, table saw, etc.) We used the radial arm saw, in conjunction with the Eze–Angleguide® (SteussyCreations, 334 Atherton Ave., Novato, CA 94945, tel. 415-897-1457) and a 6" spacer block (see Figure 2). Cut one piece from each pair with the Angleguide setup on the left side of the blade, and the remaining two pieces with the setup reversed on the right side. Use a chisel to make any adjustments for final fitting.



Clamp the rockers between the frame members to mark the locations of the dadoes.

Use the full–size pattern from the PullOut™ Plans to lay out the rockers. Draw the pattern on one piece, tape the two pieces together and bandsaw the inside curve. Don't cut the outside curve yet.

Put the crosspieces together and clamp the rocker boards between them as shown in the photo above (a couple of scrap pieces that are the same thickness as the rockers help support the clamped assembly). Trace the edges of the crosspieces

Cut the rocker dadoes before cutting the bottom curve.

After sanding the inside curve of the rocker, mark its edge on the frame members.

onto the rockers to indicate where these dadoes should be cut; then unclamp the assembly and cut the dadoes.

Rather than calculating the angles of these dadoes, place a framing square against the radial arm saw fence and add templates from the Eze–Angleguide® until they align the mark on your workpiece with the leg of the framing square. Clamp the templates to the table so they don't shift, and proceed to make the cut. The saw will want to pull the material towards the fence, so start the hogging well in from the marked edges, then work towards the line. Leave a good 1/16" inside the line so you can pare with a chisel for a snug fit.

After cutting the dadoes, drum sand the inside edges of the rockers to their finished curve. Perfect the surface now, because you won't want it to change after the next step.

Fit a rocker onto its crosspieces and trace the curve onto them. Go back to your same dado setup and hog out the waste until you get close to the curved line, and again use a paring chisel to make the final fit.

Spread glue in the joints and assemble the frames; clamp both frames simultaneously with a layer of wax paper between them to keep them from sticking together.

When you take the frames out of the clamps tape them together for the rest of the operations. Bandsaw the bottom curve, and clean it up on a disk sander. Use the band saw to shape the rest of the frame for a lighter, more graceful look. You can cut off an even ½" from each edge of the crosspieces; different size Forstner bits will make smooth, round curves in the corners. Or you can create a more free–flowing shape to the frame. Be creative, but remember that the leg rest and foot rest will be attached between the frames and you'll want some wood to hide the edges.

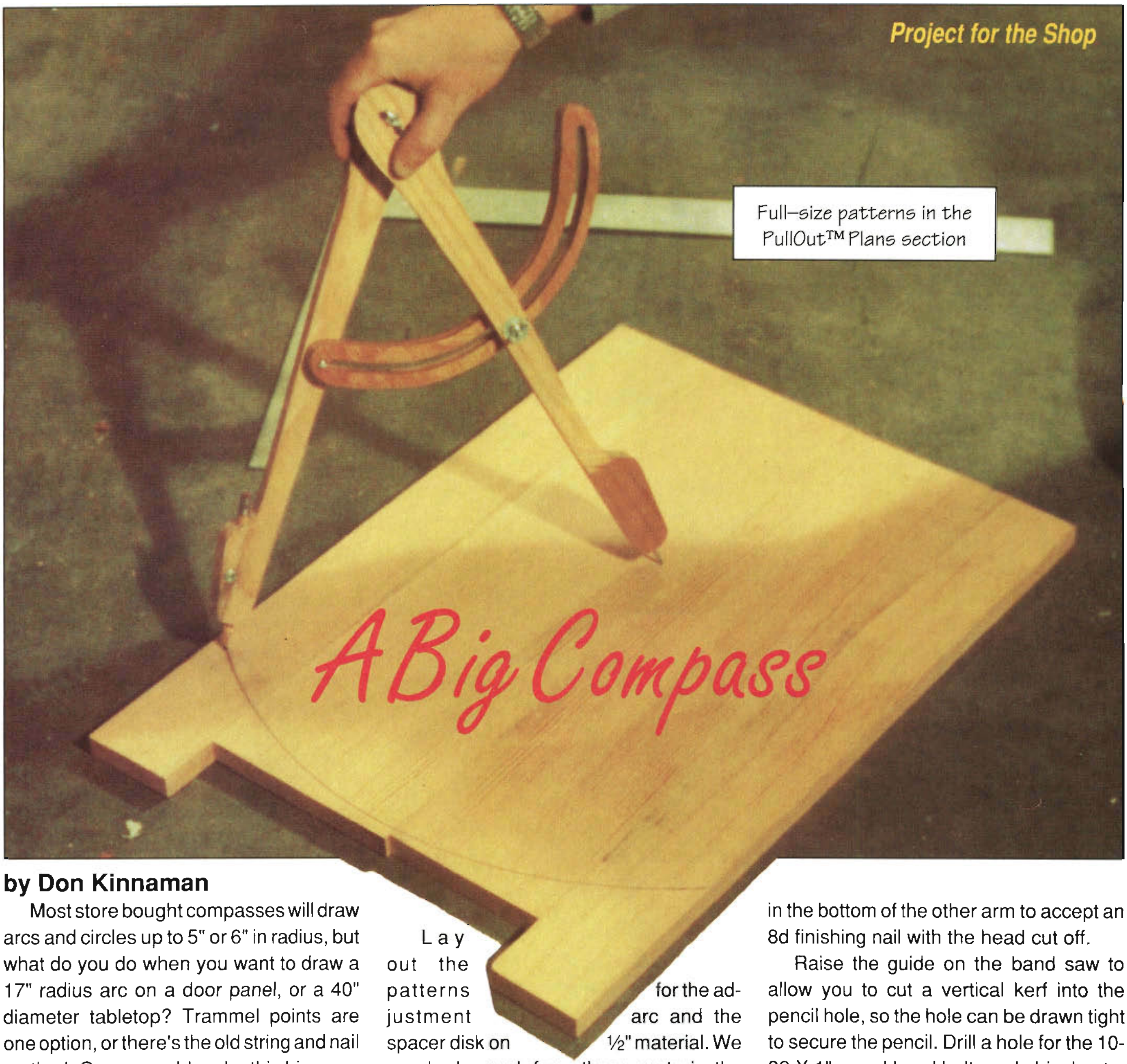
Bandsaw the curve on the bottom after the frame has been assembled.

Cut a slimmer, more elegant shape out tof the assembled frame.

A Forstner bit will cut perfect small–diameter curves.

Since you've gone to this much trouble, consider using biscuits or dowels instead of screws to attach the rests, and possibly turning a pair of spindles from your hardwood stock to substitute for the dowel stringers.

However you build the piece, this rocking footrest will give you many hours of restful pleasure. PW



Full–size patterns in the PullOut™ Plans section

A Big Compass

by Don Kinnaman

Most store bought compasses will draw arcs and circles up to 5" or 6" in radius, but what do you do when you want to draw a 17" radius arc on a door panel, or a 40" diameter tabletop? Trammel points are one option, or there's the old string and nail method. Or you could make this big compass and be covered for any curve with a radius between 3" and 21". This tool will be handy to have for laying out the seat of the spindle–back armchair project in this issue.

Start by preparing two pieces of ¾" stock that are about 2½" X 16". Stack the two pieces and tape them together; then trace the full–size pattern of the arm onto the top piece. (You'll find the pattern for this part, as well as for the adjustment arc and the spacer disk, in the PullOut™ Plans section in the center of the magazine.) The arms are exact duplicates, so cut them out simultaneously and smooth their shape with disk and drum sanders.

Don Kinnaman is a retired woodshop teacher in Phoenix, Arizona.

Lay out the patterns for the adjustment arc and the spacer disk on ½" material. We used plywood for these parts in the compass shown above, but solid hardwood would work better. Cut the curved slot in the center of the arc before cutting the outside shape to keep the piece from breaking.

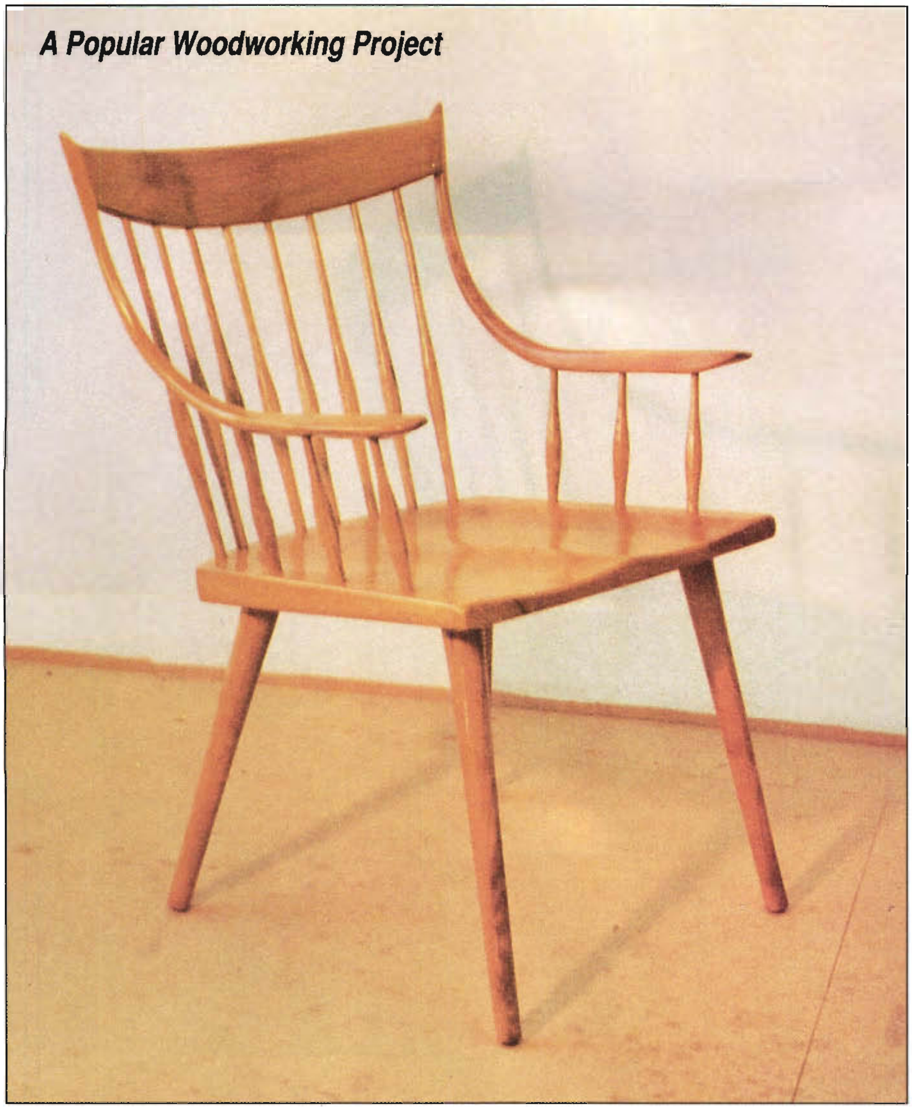
Drill some test holes in scrap to determine the best size for the pencil or pen you plan to dedicate to the compass; 5⁄16" is a good size to try first. You want a snug, sliding fit. Use a doweling jig to help you drill the hole in the arm itself; align the jig in such a way that the hole starts in the center on the bottom of the arm and follows a straight line parallel with the outside "lobe" of the arm. If the hole size you need isn't available on your doweling jig, drill the next smallest hole, then use that hole to guide the bit that is the size you need. Drill a hole in the bottom of the other arm to accept an 8d finishing nail with the head cut off.

Raise the guide on the band saw to allow you to cut a vertical kerf into the pencil hole, so the hole can be drawn tight to secure the pencil. Drill a hole for the 10-32 X 1" round head bolt, and chisel out a recess for the nut that draws the hole tight.

Go back to the band saw and resaw the arms to ⅜" thickness for most of their length, curving out from the cut as you approach the bottom ends.

Drill the rest of the holes indicated on the patterns, sand everything and apply a finish. Then put your compass together with 10-32 bolts. You'll need one that's 1½" long to run through the two arms and the spacer disk and two that are 1¼" long for attaching the adjustment arc to the arms. Use a hex head nut on the bolt that secures the fixed end of the arc and wing nuts at the other two locations. Use epoxy to glue the finishing nail in one arm and the hex head nut that's recessed in the other arm. PW

A Popular Woodworking Project



That Chair

by Ken Sadler

The first story I wrote for *Popular Woodworking* was about furniture design ("Design Your Own Furniture," *PW* #53, March 1990). Among the pictures accompanying the story was one of a spindle back arm chair. Several readers wrote in and asked if they could get information and drawings to build "that chair." The editors said yes, it would happen, and now it has. Here is "That Chair."

Those of you who built the high back chair in the November '90 issue ("Have a Seat," *PW* #57, pp. 66) already have a leg up on this one. The seat and the legs and the manner of their assembly are exactly the same with one slight exception which I'll cover later. Although the top rail is different in shape, it can be laminated in the same jig you built for that part on the other chair. All the jigs and accessories for turning long thin spindles for that chair are necessary here, as is the angle jig for drilling the seat. If you don't have that article, you can get a **free** photocopy by sending a self–addressed, stamped, #10 envelope to: *PW* Chair Reprint, 1320 Galaxy Way, Concord, CA 94520. Include

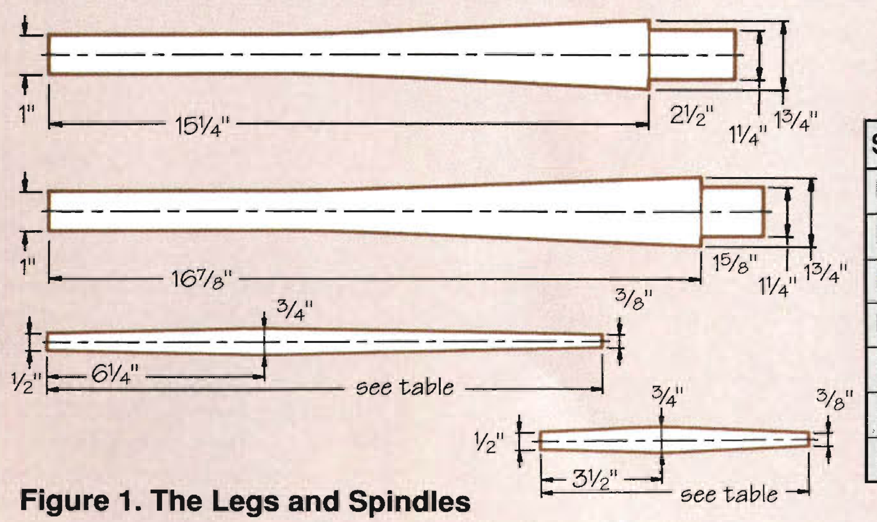


Figure 1. The Legs and Spindles

Tom Larson

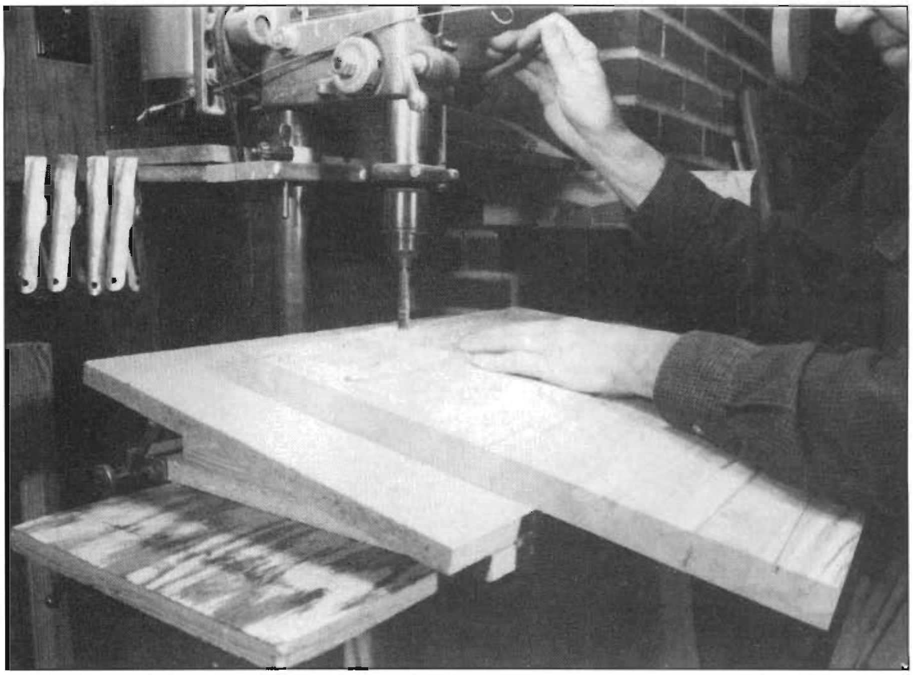
Spindle Name	Blank Length	Finished Length
back spindle #1	17½"	16¾"
back spindle #2	17"	16¼"
back spindle #3	16¾"	16"
back spindle #4	16⅝"	15⅞"
arm spindle #1	8¾"	8¼"
arm spindle #2	8¼"	7¾"
arm spindle #3	8¼"	7¾"

***Ken Sadler** is a retired furnituremaker in Portland, Oregon.*

enough postage for a two–ounce letter. However, by purchasing the actual back issue instead (see the order form on page 77), you'll get the information plus the full–size patterns in that issue's PullOut™ Plans section.

I am going to assume that you have all that information and can go ahead and turn the legs and spindles, and form and drill the seat as described therein. Note that the back spindles for this chair are shorter and that you have "arm spindles" instead of "support spindles" (see Figure 1 and the table below). The difference I mentioned in the seat is that instead of one hole for a support spindle, there are three holes for arm spindles. Their position on the seat is shown in Figure 2, and you should indicate them on your top surface template. The holes are the same diameter as the back spindle holes and are drilled at the same angle (100°). When drilling them, be sure that the bulk of the seat is between you and the drill bit and that the edge of the seat is parallel to the top edge of the drill jig. Aside from this, you can go ahead and finish the seat and leg assembly just as in that other article—right down to the final sanding.

The back spindles are turned in the same manner as for the previous chair, using the steadyrest. However, the arm spindles are so short that they don't need it.


author

Drill holes at 100° to the seat blank to accept the spindles. You'll need the angle–drilling jig and the 10° blocks described in "Here's An Angle" (PW #57, p. 72).

The laminations for the top rail of this chair are thinner than before because the part is 5/8" thick instead of 3/4". For this chair, you'll need three pieces that are 7/32" X 4" X 24". Cut the pieces from one board and assemble them in the jig in the order in which you cut them. If you do the cutting on a circular saw, use a hollow–ground planer blade with as narrow a kerf as you can get.

The arms come next. I'll tell you right off, these are difficult and tricky parts to make. A band saw and a good spokeshave are essential tools. As you can see from the picture, they are curved and we get that curve by lamination. That necessitates the jig shown in Figure 3. I made the base of the jig out of 3/8" CDX plywood. The straight jig blocks are cut from a piece of fir 4 X 4, and the curved block is made up of three layers of 3/4" CDX plywood. Fasten them in place with glue and screws driven through the base and into the blocks. They

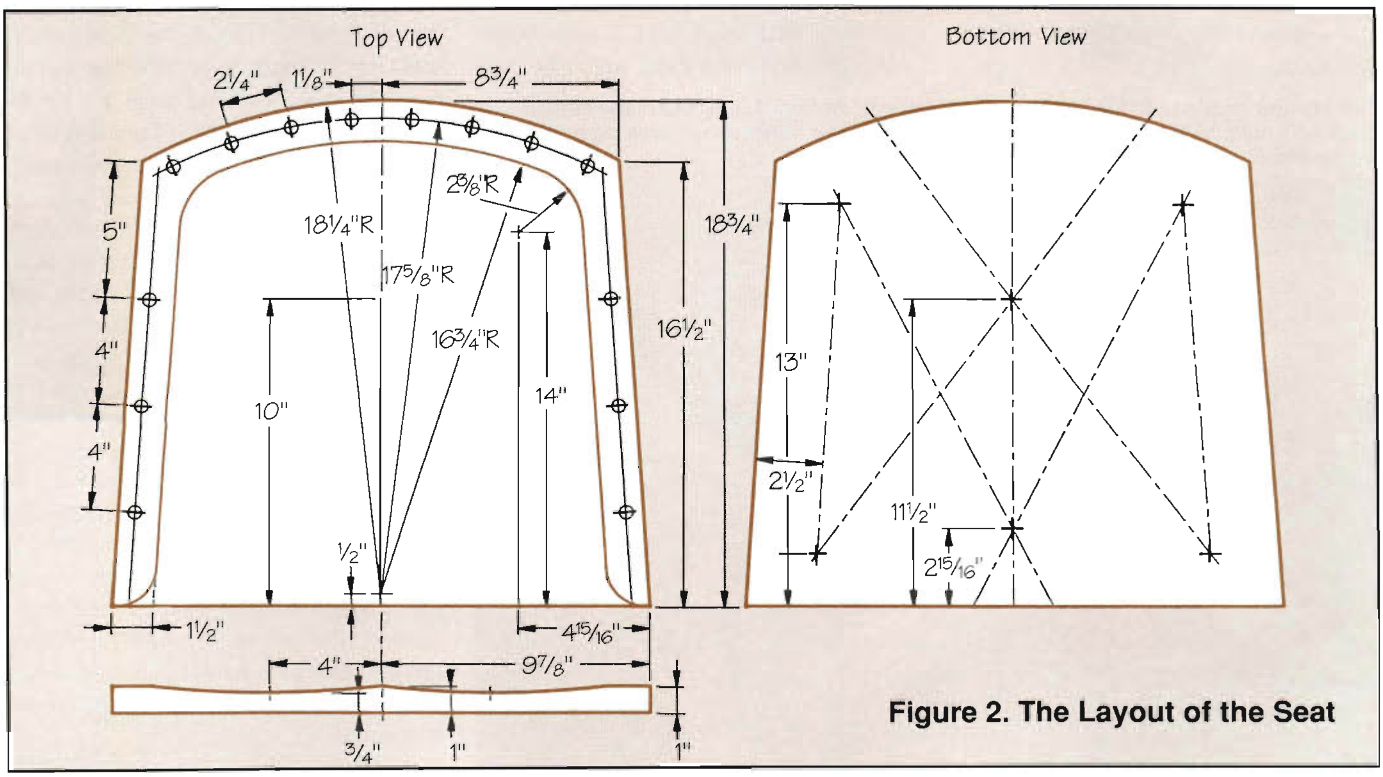
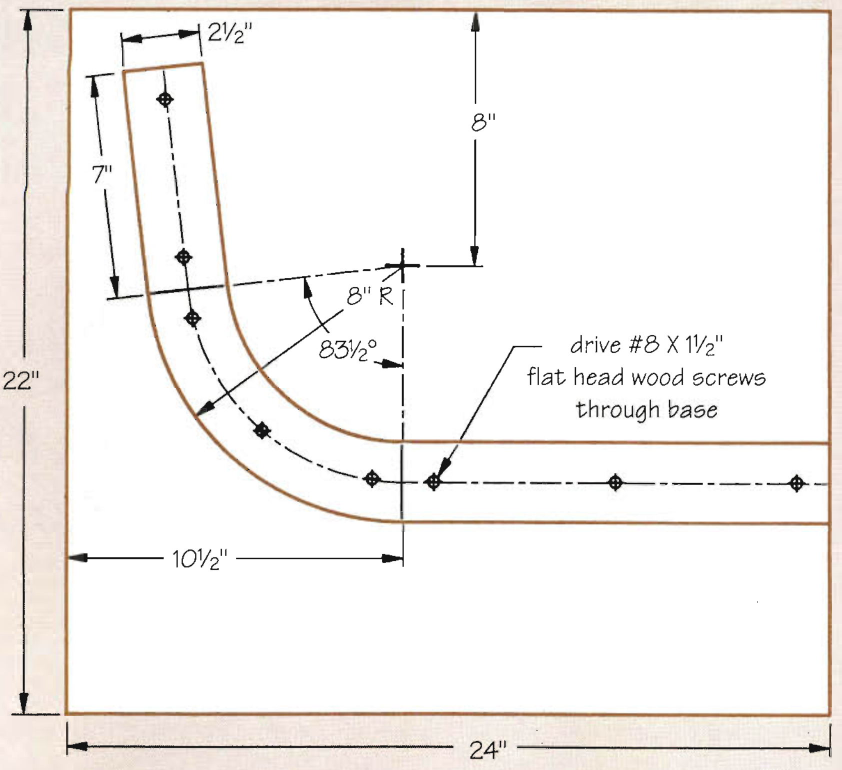


Figure 2. The Layout of the Seat

Figure 3. The Arm–Bending Jig

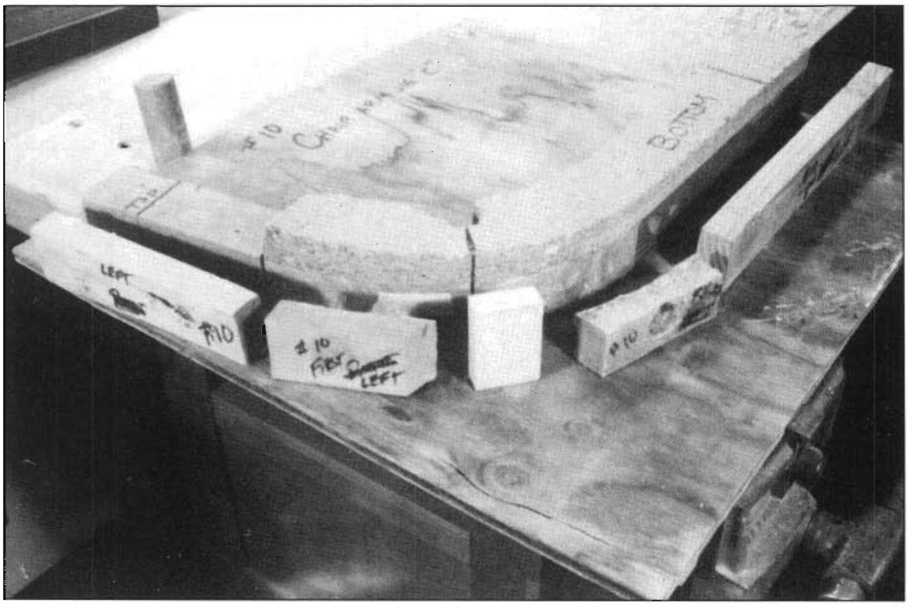


Tom Larson

will be subjected to some strong forces so they must be securely fastened. The clamp blocks can be cut from scrap material to fit as shown in Figure 4. Don't neglect to put in the top and bottom marks as well as the mark for the starting point (see Figure 4). You will need four 6" and three 5" heavy–duty C–clamps.

The laminations are $^3/_{16}$" X $2^1/_4$" X 29" and six are required for an arm. Cut them from a 2" X $2^1/_4$" X 29" board. The $2^1/_4$" face that goes against the rip fence first should be jointed smooth and square to the 2" face. This surface will be the inside of the curve against the jig blocks. As with the top rail laminations, cut them with a hollow–ground planer blade, and keep them in the order in which you cut them. As each set is cut, tape them together so that they won't get mixed up. It's also a good idea to mark them left and right so you won't get confused later.

The straight sections of the arm–bending jig are made from 4 X 4 blocks; the curved portion is built up from pieces of ¾" plywood. Bandsaw concave surfaces on two of the clamp blocks.



author

Before actually gluing up a set, it would be a good idea to have a dry run, in order to get the hang of things. Once the glue is in place there isn't much room for error or time to run after something you forgot.

I've found that the best way to hold the jig while doing the job is to grip it between the adjustable dog on your vise and a pin in the bench behind the vise.

Measure along the jig blocks from the top marker to the position of the #1 clamp or starting point marker (see Figure 4). Add about $1^1/_2$" and measure this distance from the top end of your set of laminations. Make a heavy mark across all the laminations at this point on the side that will be up. The weight of this mark is not so important on the dry run, but with the glue in place, a light line can become obscured. Now, place the set in the jig with the mark at the starting point marker. Put the #1 clamp with its clamp block in place and tighten it, but not entirely. Put the #2 clamp and block in place and pull it up enough to hold it firm. Position the #3 clamp and its clamp block, and pull it up enough to hold it in place. Now slowly tighten the #2 clamp two or three good turns, then do the same with the #3 clamp. Continue this until you have the inner face of the lamination almost touching the jig blocks at these points. Now, put the long clamp block and the #4 clamp in place and tighten it until the inner face is almost to the jig blocks, then tighten #2 completely, as tight as you can get it. Do the same for #4 and then #1 and #3. Now put #5 and #6 and their clamp block in place, and tighten them fully. Lastly, set the #7 clamp, and tighten it fully. If everything has gone smoothly, you're ready to do it with glue.

Before doing the job with glue, however, there is an additional and very necessary step that was purposely left out of the dry run. This step is to line the jig with wax paper so you'll be able to get the blank out of the jig. Cut several strips of wax paper about 6" wide and 12" long and fasten them in place with masking tape so that the face of the jig blocks and the entire flat surface of the jig in front of the blocks is covered.

When applying the glue, cover both

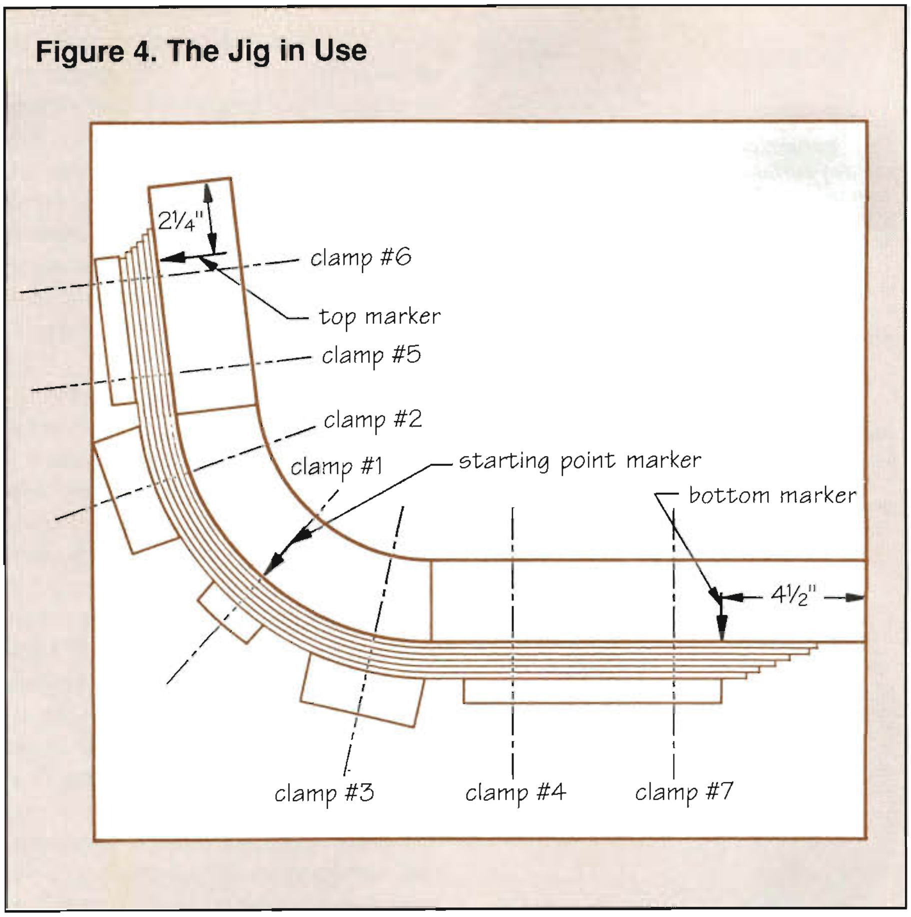


Figure 4. The Jig in Use

surfaces of the mating faces entirely. Be sure to keep the pieces in order. Put them in the jig and proceed as in the dry run. Now that there is glue between the laminations, they will want to move around relative to each other. You won't be able to control this entirely but you should push them back into place as best you can during the tightening process. (That's the reason for the extra width and length.) You will also have excess glue oozing out top and bottom. Don't be concerned about this; it will all clean up later.

After about six hours you can take the blank out of the jig and glue up the other set. When the blanks come out of the jig, the wax paper will stick to the underside and there will be *wet glue between* the paper and the blank. Peel the paper away and scrape off as much wet glue as you can. It will speed the final drying and save work later on.

While the arm blanks are drying, take the top rail blank out of the jig. Joint what will be the top edge until it is even and square with the convex face. Rip the blank to $3\frac{5}{8}$" wide. When it comes out of the jig the ends of the blank will be uneven. Mark the center of the portion that is the full thickness. Make a template from the full-size pattern in the PullOut™ Plans section and align its centerline to this point, with the top edge flush to the top edge of the blank. Tape it firmly to the concave face and trace the pattern onto the blank. The two lines indicating the ends of the rail must be accurate and straight. Remove the template but do not cut the curved edge at this time.

The ends of the rail are cut at a compound angle and the operation is a bit tricky. Using the planer blade, set your table saw blade angle at 21° and the miter gauge at 10° to the right. Place the convex face of the blank down and the top edge against the miter gauge, hold the blank flat on the table at the point of the cut, and cut along the line. Reverse the miter gauge to 10° left, reverse the blank so that the bottom edge is against the miter gauge and make the cut on the other end. Now you can bandsaw the curved bottom. Clean up the sawed edge with a spokeshave and round the corners just a little. Don't touch the end cuts, and don't round the corners of the top edge at this time.

On the bottom edge lay out the centers of the spindle holes as shown on the pattern. With a 3/8" Forstner bit chucked in the drill press, drill the holes to a depth of 3/4" at the hole centers. Be sure that the top edge is flat on the drill press table and that, regardless of which hole you're drilling, most of the rail is supported by the table. This will ensure that the holes are parallel to the faces of the rail and straight from side to side. Set this part aside for now.

By this time you should have two arm blanks made up with the glue dried for at least 24 hours, so you're ready to start making the arms. The first step on each blank is to joint one edge flat and at right angles to the convex side. In doing this, recognize that the longer straight section, marked "bottom" on the jig, is the main part

Make the compound cut on one end of the chair rail with the blade set at 21° and the miter gauge at 10° to the right. Turn it to 10° the other way, and put the opposite edge against it to cut the other end.

of the arm and that, being arms, they must be opposites. Thus, when placed on the bench side by side with the bottoms down, the *inner* faces must be smooth. Once you've done this, place the arm that will fit with the smooth side down, back in the bending jig, and mark the top and bottom cutoff points. Make these cuts, put the arms together, mark the other one and make those cuts.

You are now ready to begin shaping. This is where arm–making gets a bit tricky. In the PullOut™ Plans you will find full–size patterns for the top of the arm and the side of the arm. Make templates from these on light cardboard. Place the first template on the top of the arm with its straight edge flush with the smooth edge of the arm, and the front edge of the template as far forward as possible, and trace the template onto the arm (flop the template over for the opposite arm). Go to the top of the arm and measure 3/4" from the smooth edge and make a mark. Connect that mark and the upper end of the outside line from the top template with a straight line. Bandsaw the shape, leaving the line, but leave the front corners square. Be sure to keep the convex face of the arm flat on the table while making this cut. There is a tendency to tip it when negotiating the curved section.

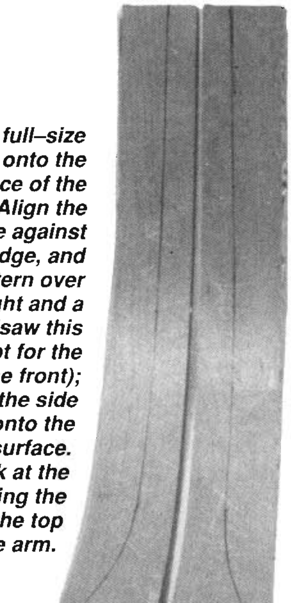
Place the side template on the newly sawn edge with its concave edge flush to the concave face of the arm. Trace the outer edge of this template. Now bandsaw this shape, leaving the line, and again, do not cut the front part of the shape. You will need it to guide you when cutting the bevel I will discuss shortly.

On the pattern you will notice a line near the top of the arm marker which indicates the bottom edge of the top rail. Transfer this line to the blank and carry it around to all four sides of the blank. This line is important for two reasons: it is where you stop the initial shaping of the arm, and it is vital while assembling the arm to the top rail.

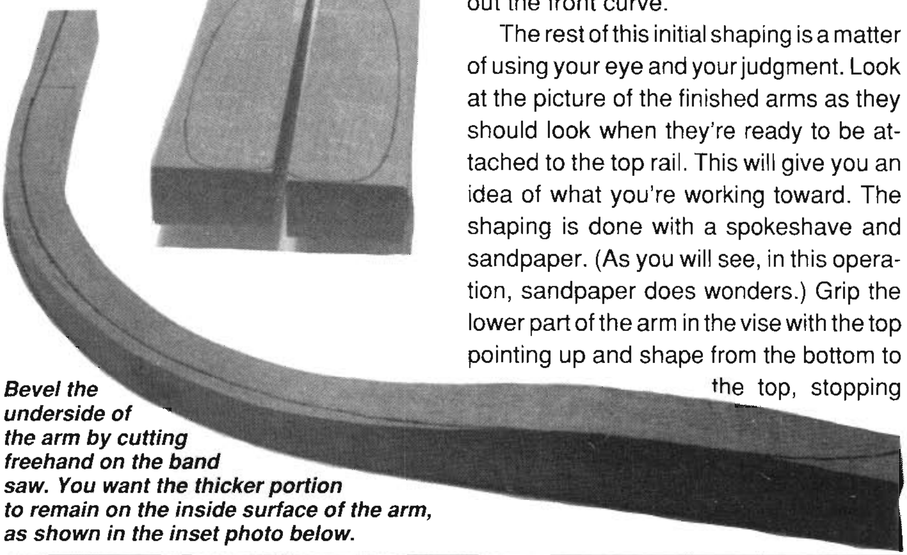
This next roughing cut is the most difficult to make; it's even hard to explain. It makes a bevel on the bottom surface of the main part of the arm, and you can see me making the cut in the photo to the right. The bevel runs from the lower corner of the smooth edge upward toward the top of the shaped face. The edge of the bevel runs parallel to the top face. The saw blade enters at the bottom of the second lamination and comes out just above the corner of the smooth edge and the bottom face. The only way to make the cut is freehand on the band saw. When finished the arm will look like the one in the inset photo below. I have included the cutoff piece to help you understand just where and how the cut is made. If you make the bevel in the wrong direction, you will ruin the arm and have to make a new blank. Remember, the smooth edge (which is the inside edge of the arm) is not cut into.

Now with the inside edge of the arm flat down on the bench, measure $2^1/_2$" from the front along the bottom edge, and strike a line from there to the top front corner. With the arm flat down on the band saw table, cut along this line. You have now roughed out the front curve.

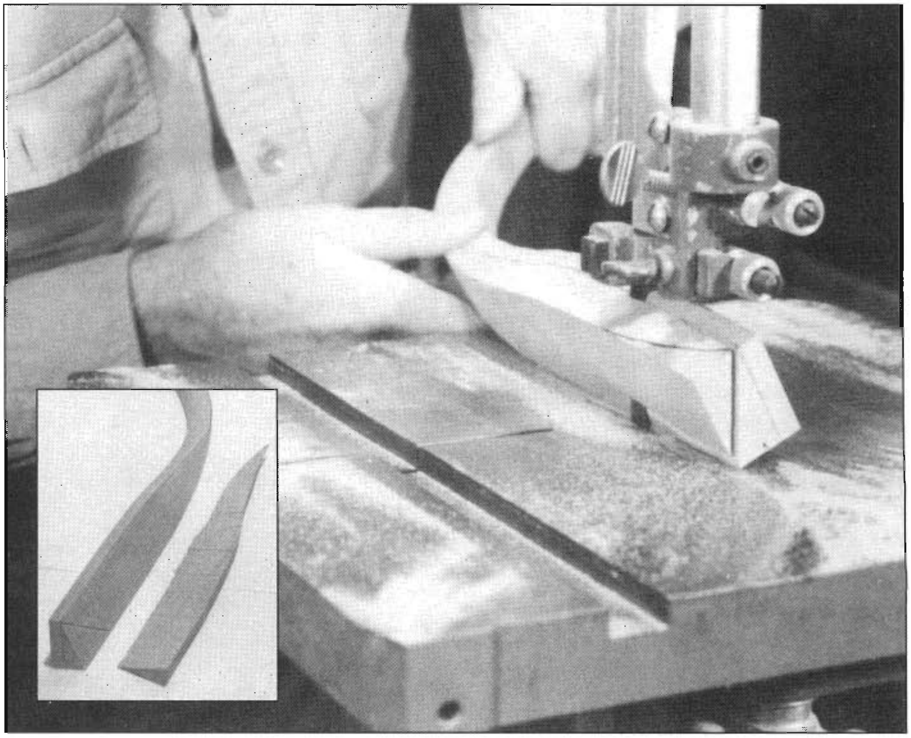
The rest of this initial shaping is a matter of using your eye and your judgment. Look at the picture of the finished arms as they should look when they're ready to be attached to the top rail. This will give you an idea of what you're working toward. The shaping is done with a spokeshave and sandpaper. (As you will see, in this operation, sandpaper does wonders.) Grip the lower part of the arm in the vise with the top pointing up and shape from the bottom to the top, stopping

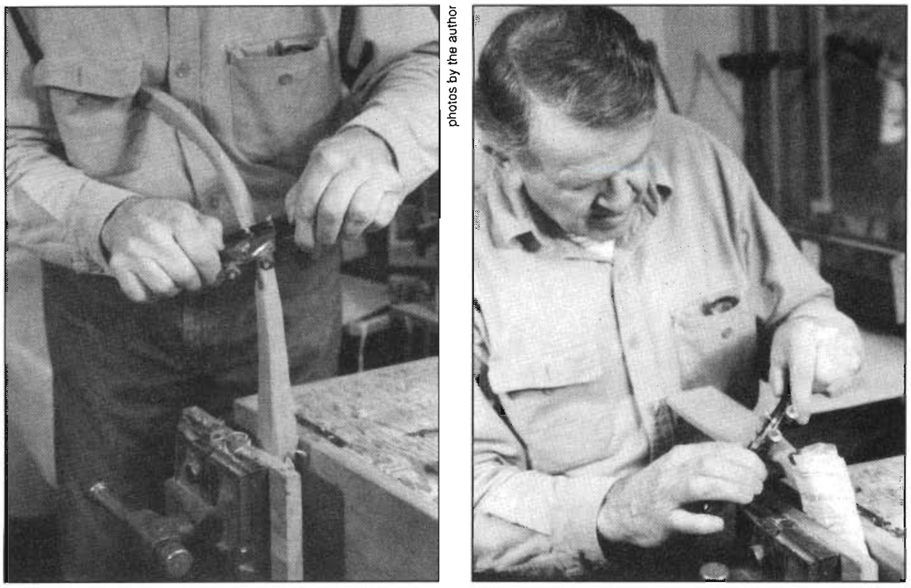


Trace the full–size pattern onto the concave surface of the arm blanks. Align the inside edge against the jointed edge, and flop the pattern over to create a right and a left. Bandsaw this shape (except for the curve at the front); then trace the side pattern onto the bandsawn surface. Note the mark at the top indicating the point where the top rail joins the arm.



Bevel the underside of the arm by cutting freehand on the band saw. You want the thicker portion to remain on the inside surface of the arm, as shown in the inset photo below.





photos by the author

Use a spokeshave to shape the upper portion of the arm from oval to round and blend the surfaces that form the flat lower portion.

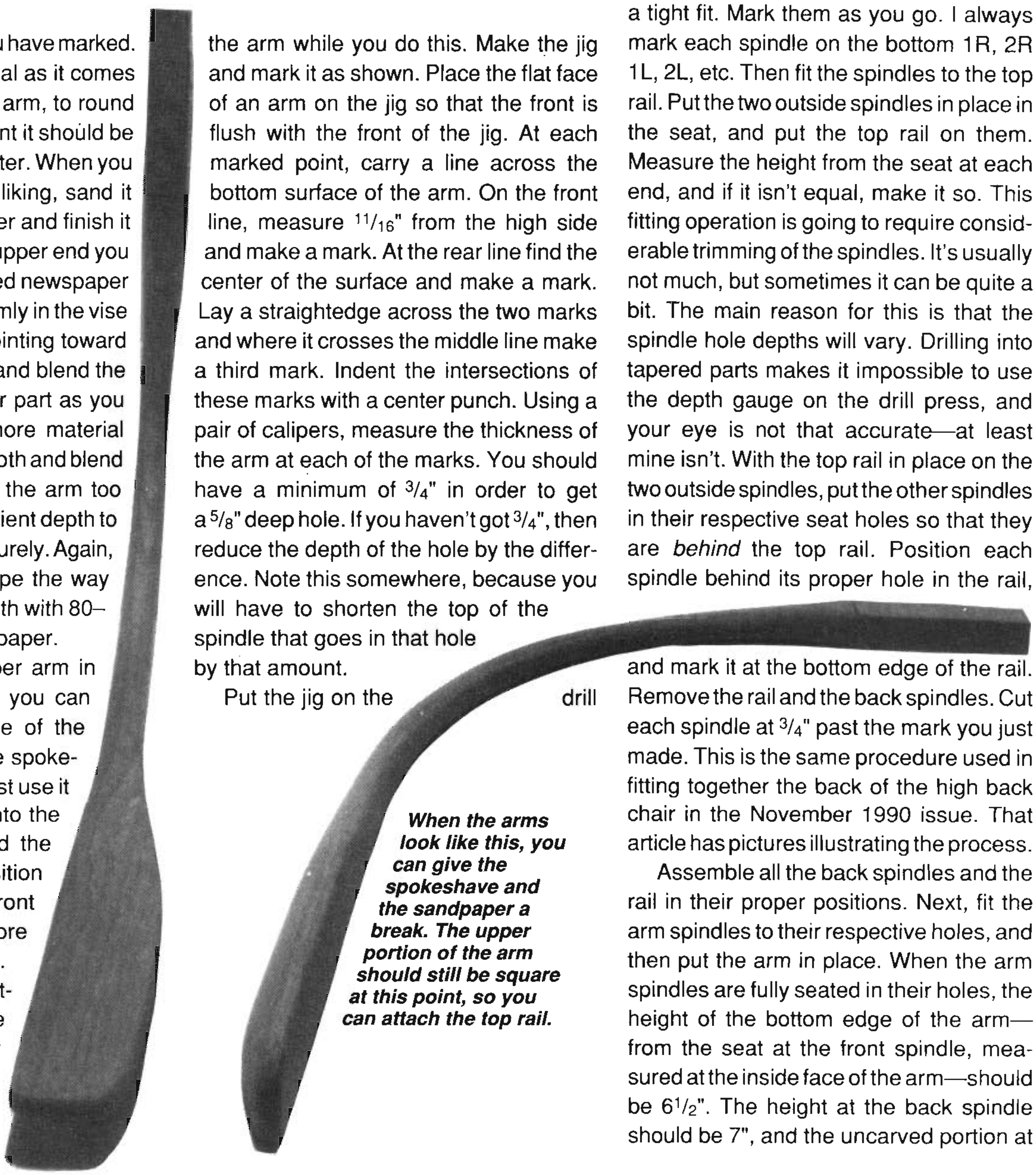
short of the top rail line you have marked. The shape goes from oval as it comes out of the flat part of the arm, to round at the top line. At this point it should be slightly over $^{5}/_{8}$" in diameter. When you have the shape to your liking, sand it smooth with 80–grit paper and finish it with 150–grit. Wrap the upper end you have just finished in folded newspaper to protect it, and grip it firmly in the vise with the lower portion pointing toward you. Shape toward you and blend the upper part into the lower part as you work. Don't take any more material than is necessary to smooth and blend the surfaces. If you get the arm too thin, there won't be sufficient depth to hold the arm spindles securely. Again, when you have the shape the way you want it, sand it smooth with 80– and finish with 150–grit paper.

Still gripping the upper arm in the vise, turn it so that you can work on the flat surface of the lower arm. Don't use the spokeshave on the flat itself; just use it to blend the upper flat into the upper arm and to round the corners a little. In this position you can also round the front corners; then do some more finishing with sandpaper.

The last step before attaching the arms to the top rail is to drill them for the spindles. Figure 5 on the following page shows a simple jig to support the arm while you do this. Make the jig and mark it as shown. Place the flat face of an arm on the jig so that the front is flush with the front of the jig. At each marked point, carry a line across the bottom surface of the arm. On the front line, measure $^{11}/_{16}$" from the high side and make a mark. At the rear line find the center of the surface and make a mark. Lay a straightedge across the two marks and where it crosses the middle line make a third mark. Indent the intersections of these marks with a center punch. Using a pair of calipers, measure the thickness of the arm at each of the marks. You should have a minimum of $^{3}/_{4}$" in order to get a $^{5}/_{8}$" deep hole. If you haven't got $^{3}/_{4}$", then reduce the depth of the hole by the difference. Note this somewhere, because you will have to shorten the top of the spindle that goes in that hole by that amount.

Put the jig on the drill press table, and set the arm back on the jig as you had it before. Position it and the table so that the upper part of the arm hangs over the rear of the table and you can reach all three holes without shifting the table. You will need a $^{3}/_{8}$" brad–point drill bit. In order to be sure that I don't drill too deep, I measure the depth on the drill bit and wrap it with masking tape above that point. You don't have much leeway and you don't want to come through the top surface. In the drilling operation, you hold the arm on the jig with the left hand, moving the jig and the arm from position to position, and operate the drill press with your right hand.

It is now time to fit the back and arms together. Start with the back. First fit all the back spindles to their holes in the seat and in the top rail. This should be a snug but not a tight fit. Mark them as you go. I always mark each spindle on the bottom 1R, 2R 1L, 2L, etc. Then fit the spindles to the top rail. Put the two outside spindles in place in the seat, and put the top rail on them. Measure the height from the seat at each end, and if it isn't equal, make it so. This fitting operation is going to require considerable trimming of the spindles. It's usually not much, but sometimes it can be quite a bit. The main reason for this is that the spindle hole depths will vary. Drilling into tapered parts makes it impossible to use the depth gauge on the drill press, and your eye is not that accurate—at least mine isn't. With the top rail in place on the two outside spindles, put the other spindles in their respective seat holes so that they are *behind* the top rail. Position each spindle behind its proper hole in the rail, and mark it at the bottom edge of the rail. Remove the rail and the back spindles. Cut each spindle at $^{3}/_{4}$" past the mark you just made. This is the same procedure used in fitting together the back of the high back chair in the November 1990 issue. That article has pictures illustrating the process.



When the arms look like this, you can give the spokeshave and the sandpaper a break. The upper portion of the arm should still be square at this point, so you can attach the top rail.

Assemble all the back spindles and the rail in their proper positions. Next, fit the arm spindles to their respective holes, and then put the arm in place. When the arm spindles are fully seated in their holes, the height of the bottom edge of the arm—from the seat at the front spindle, measured at the inside face of the arm—should be $6^{1}/_{2}$". The height at the back spindle should be 7", and the uncarved portion at

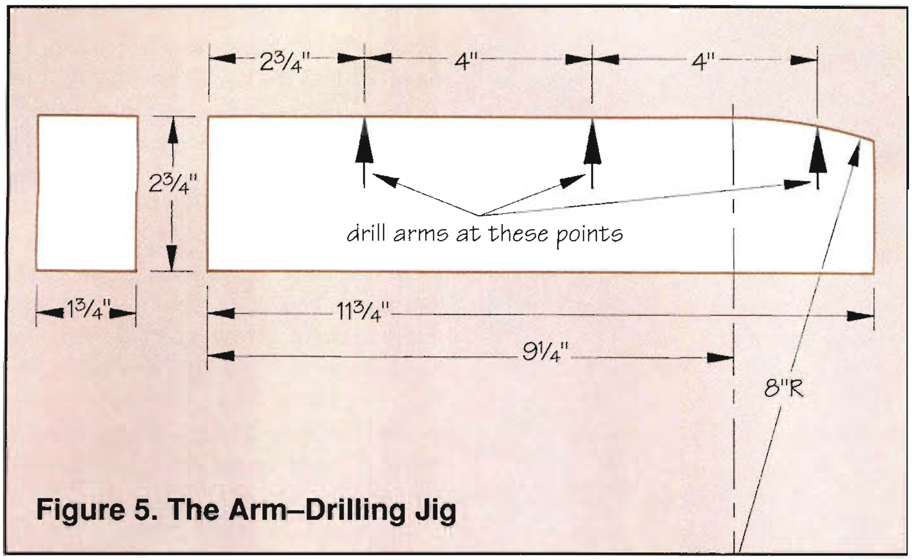
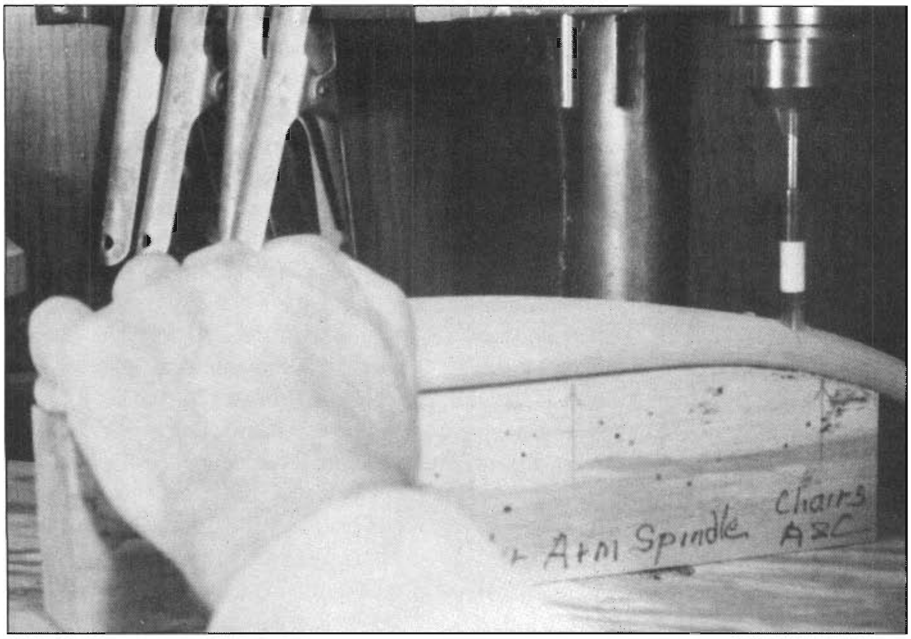


Figure 5. The Arm–Drilling Jig

Tom Larson



author

This slightly curved block supports the arm while you drill the underside for the spindle holes. Use masking tape on the drill bit as a visual depth stop.

the top of the arm should line up pretty closely with the end of the top rail. If it's too high and too far forward, trim the back spindle (at its top end). If it's too low and too far back, trim the front spindle. The bottom edge of the top rail should be close to if not on the mark you made on the arm.

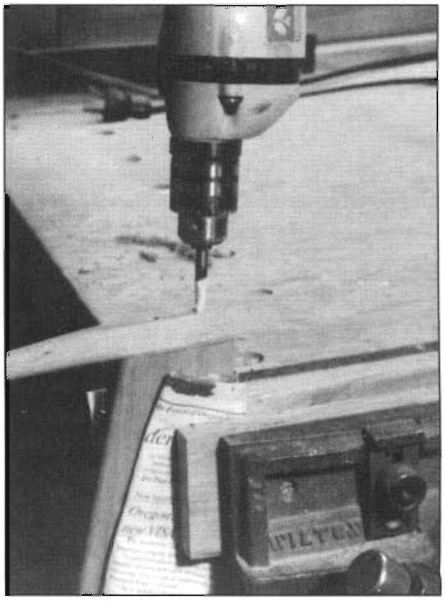
It is now time to glue the arms to the top rail. Do not put any glue in any of the spindle holes at this time. To do this operation right, you will need two 12" bar clamps, one 24" or larger bar clamp, four small 10° wedges, two spring clamps that will open at least 7/8", and two thin flat wooden pads. It is best to do this clamping operation dry first, in order to make sure you have everything you need and that it all works. Once the glue is in the joint, it's too late to correct mistakes.

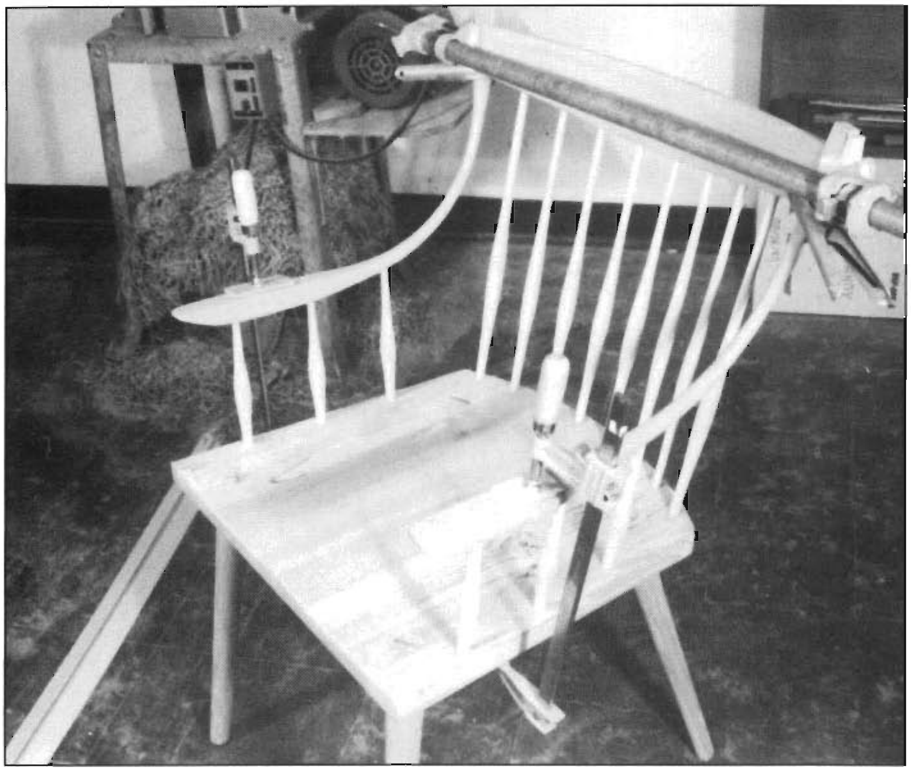
Using a wedge under the seat and a pad on top of the arm, clamp the arm assembly to the seat with one of the 12" bar clamps. Place it between spindles 2 and 3. Using masking tape, tape a wedge to each arm opposite the top rail end. Place a spring clamp across the bottom of the joint to hold the parts in line while you apply the 24" bar clamp across the front. The joint faces should mate but the relative positions of the rail and arms don't have to be perfect. You're going to do quite a bit of final shaping in this area. If everything has worked as it should, take the bar clamp and the two spring clamps off, put glue in the joint and replace the clamps. Allow this to dry for at least 24 hours. This is a naturally weak joint, and although you're going to strengthen it later, you don't want it to come apart in the process.

When you're sure that the glue is thoroughly dry, remove the arm and top rail assembly from the chair and remove all the spindles. Be sure that you mark them carefully so that you can get them back in the right places. Using several layers of newspaper, grip the assembly in the vise as shown in the photo below. Use a spokeshave to flatten the top edge of the upper arm parallel with the end of the rail. Draw a line across this flat about 5/8" from top and bottom of the rail. Choose a point on these lines that is midway of the thickness of the rail (this will have to be as much by eye as by measurement). Now with a 1/4" spur bit in your hand drill, drill through the upper arm and about 3/4" into the rail as shown in the picture. This takes careful aiming so that you don't come out the side of the rail. Prepare a 1/4" dowel of sufficient length that it will extend past the surface when fully in the hole. The dowel should have a breather groove down one side and be a tap fit in the hole. Put glue in the top half of the hole and tap the dowel in as far as it will go. Now do the other arm the same way.

Allow time for the glue to dry and you're ready for final shaping of the upper arms. Grip the assembly in the vise the same way you did for the drilling, except the arm should be somewhat higher above the vise to give you more freedom to use the spokeshave. In doing this shaping, the outer edge of the arm should be a straight line, no bulge opposite the end of the rail. The front and back of the arm should blend

After gluing the arms to the back rail, strengthen the joint with screws.





Glue the arms to the back rail with the spindles dry–assembled in place. Wedges with a 10° taper help the clamps apply even pressure.

into the rail and the arm should be the same thickness as the rail at this point. The inside of the arm should be rounded as close as possible to the bottom edge of the rail. This part will take a little file work and considerable sandpaper work. Sand the joint area all over, and use the sandpaper to help smooth out the final shaping. I find that 80–grit paper is excellent for this.

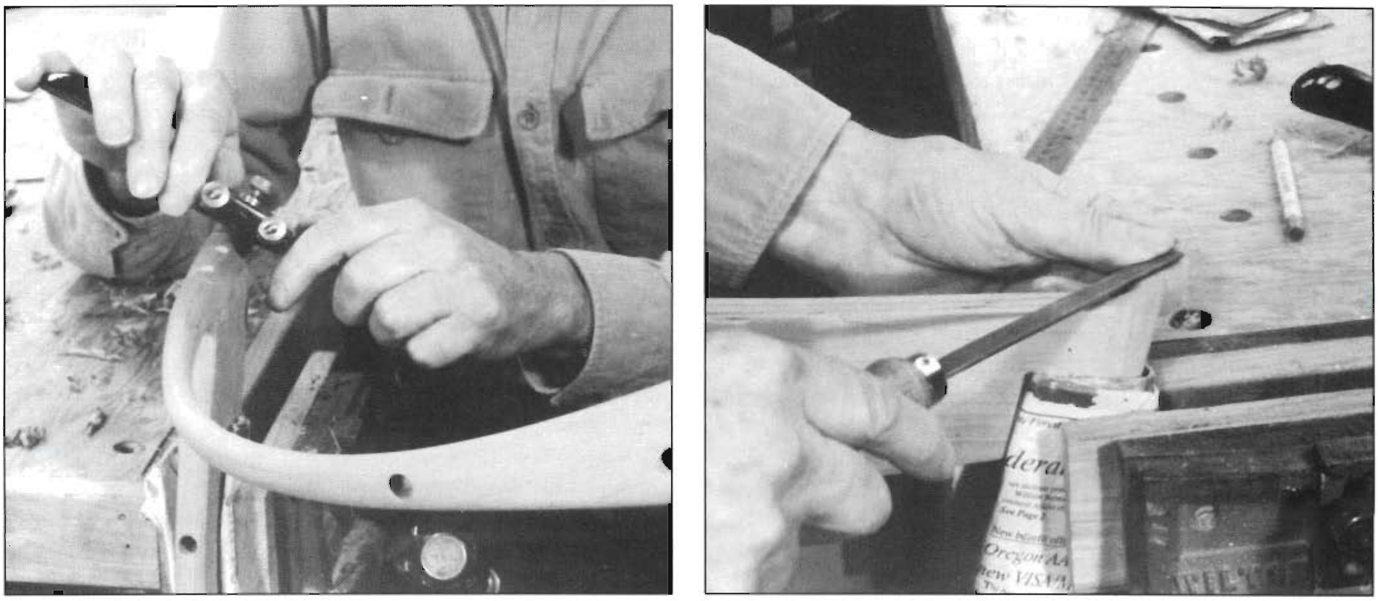
The last operation before final assembly is the shaping of the ears. Grip the assembly in the vise as shown in the right–hand photo below. Measure up from the top of the rail about $^{1}/_{2}$" to $^{5}/_{8}$" and draw a line around the arm extension. Now draw a concave line from the line at the outside of the arm to the top of the rail. Using a coping saw, saw along this line (leaving the line). With a half–round, fine–cut file and sandpaper, shape and smooth the ear as shown in the picture. Then round the top corners of the rail (using a spokeshave) and sand the top edge smooth.

Now for final assembly. Do this dry first so that you're sure you have all the spindles in the right places and that everything fits properly. The best way to make this assembly is to put the spindles in the arm and rail assembly first, then fit that assembly to the holes in the chair seat. Make sure that all the spindles bottom in their holes. You may find that the two front arm spindles want to pop up a little. If this is the case arrange some means of holding them down firmly before you put the glue in. When you're sure everything is okay, take it all apart and start gluing. Glue the spindles in the arm and rail assembly first, and allow the glue to set for an hour or so. Then put glue in the seat holes and fit the assembly as before. Be sure you put glue only in the top half of the holes. If you put it all the way, you'll have too much, and the spindle will push the excess to the bottom which will keep the spindle from going home.

Only finishing is left. I will say what I always say, no stain. I use several coats of Formby's Tung Oil Finish hand–rubbed on.

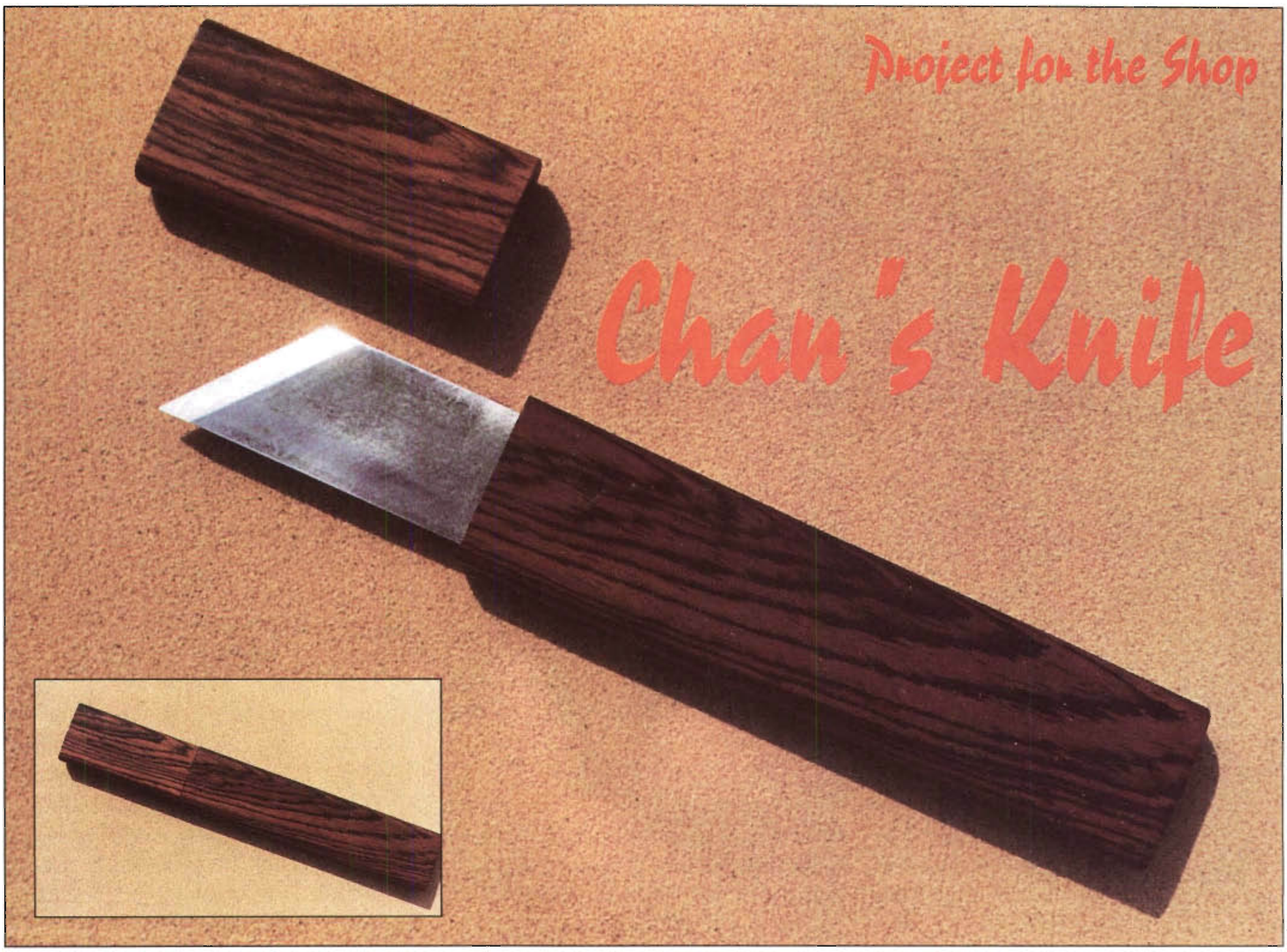
When you have finished with this project I think you will be pleased with what you have done. Some of you will also have acquired a new skill, shaping with a spokeshave, one that you will find most useful in the future. This design makes a great desk or dining chair. It looks good and it is very comfortable. When I was in business, I sold almost a hundred of them—usually in groups of four or six, as dining chairs. I hope you like it as well as my clients did. PW

With the arm–to–back joint reinforced and the screw holes plugged, you can finish shaping the assembly. Round the upper edges of the arms, and saw and file the tops to blend nicely with the rail.



Project for the Shop

Chan's Knife



author

by Simon Watts

I first met Yeung Chan during a class in wooden boatbuilding. We were building a Norwegian pram and I soon noticed Yeung's unusual knife and the confident skill with which he shaped the curved cypress frames. I tried it out and realized it was really a combination chisel and knife with a cutting edge that you pushed away. It seemed to have endless uses and fitted the hand so comfortably I was reluctant to give it up. "I make you one" said Yeung, and I forgot all about it. A few weeks later he turned up at the boatshop with a shy smile—and a new knife with a rosewood handle.

Yeung Chan made his first knife when he was about ten years old, from a hacksaw blade and a piece of plywood—"It was all I could get." His parents in the China of the 1950's were too poor to buy toys so Yeung made his own using his knife and a few other simple tools. At age 17, in spite of his interests and obvious ability with wood, he was sent to plant rice and beans in south China. After 5 years of this forced farming, he escaped to Hong Kong. He then made his way to New York and from there to California in 1977. He is now a partner in Kane Design Studio, San Francisco, where he makes prototypes for contract furniture companies.

Yeung now makes his knives with hardwood handles and the heavy–duty hacksaw blades used in machine shops. This steel has all the essential qualities to make excellent blades—hard enough to hold a keen edge, but still amenable to being sharpened. It also has the toughness necessary to resist chipping and breakage.

Not all hacksaw blades are the same; some are hardened only along their cutting edges. For this style knife you must get one that has been hardened across its whole width. Yeung says that he can tell by the 'ring' of a blade what he needs to know about its temper. An alternative might be jointer or planer knives made of high–speed steel.

When starting a new knife Yeung's first step is to make a full–size template of the blade profile in 1/8" plywood. He then uses this to mark out the exact shape on the steel (see Figure 1). Shaping such a tough material can be a chore. Yeung stresses the importance of extreme caution and the use of a substantial face shield. Use a coarse grinding wheel (60 or 80 grit) in a bench grinder. Set the tool rest level, and cool the steel when necessary with water.

The next step is to adjust the angle of the tool rest and grind the cutting edge to a bevel of about 15°. Making this angle more acute will give you a keener edge, but one too fragile to be practical. If you favor your right hand, grind the bevel on the surface with the point to the left. If left–handed, grind the opposite surface. Don't hone the blade yet, but set it aside and start on the handle.

For the laminated handle Yeung likes to use a hard, dense wood such as rosewood, snake wood, ebony or lignum vitae. In fact practically any hardwood—walnut, cherry, maple, oak—will do.

First cut out the blank to the size and shape shown in Figure 2. Then bandsaw it

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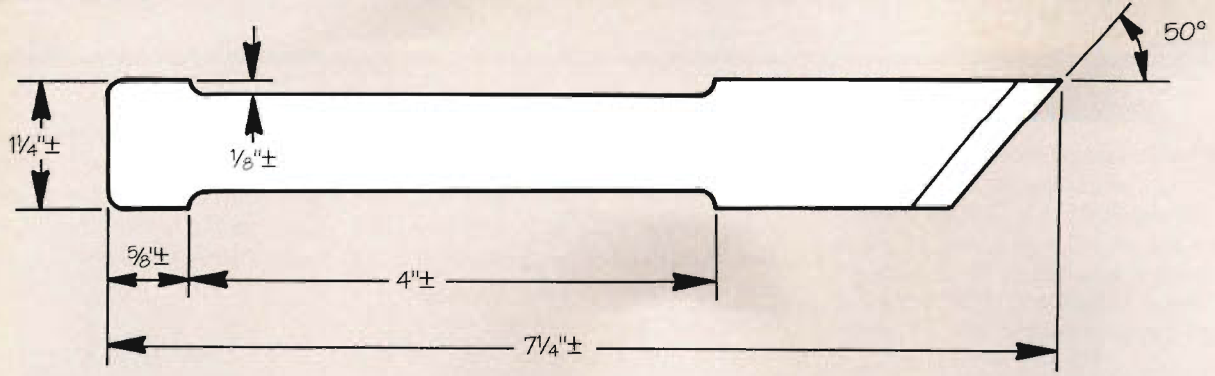
Simon Watts is a freelance writer and boatbuilder. He lives in San Francisco.

Figure 1. The Blade



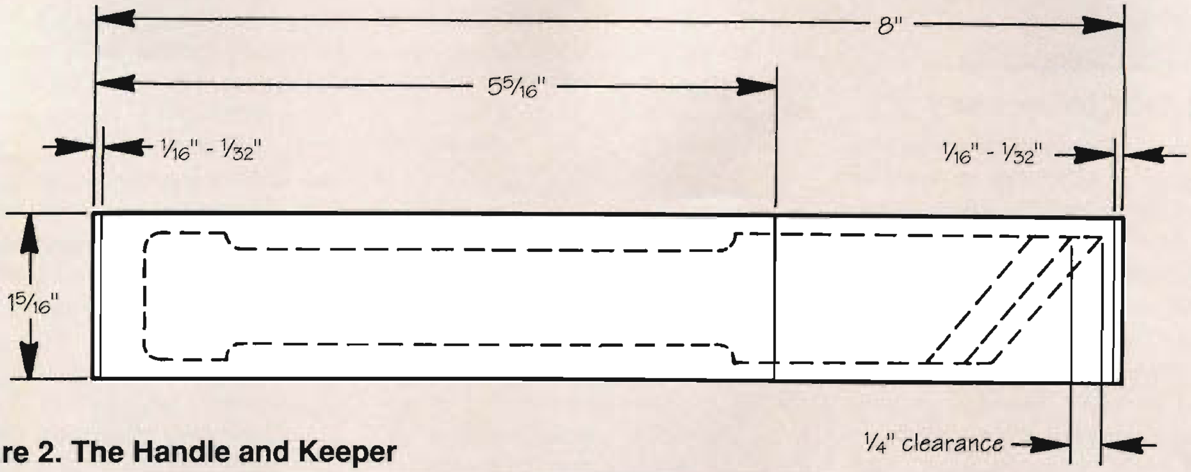


Figure 2. The Handle and Keeper

Robert Chapla

down the middle so as to have two identical pieces with matching grain. Then skim off the sawn surfaces on the table saw so each is 1/4" thick. If your saw isn't up to this, use a block plane or cabinet scraper.

Mark both sides of the blade to show the amount that will project beyond the handle—about 2 1/2". Lay the blade on one half of the handle, and mark around it with a pencil adding 1/4" at the blade end for clearance. Do the same with the other half, making sure that when the two halves are glued up, the grain pattern will be the same as it was in the original block.

Set up a router with a 1/4" straight bit so the depth of cut is half the thickness of the blade. This is a crucial dimension, so practice on a piece of scrap first. Rout out each half keeping within the pencil lines. Lay some scrap that is the same thickness as the handle half around the handle to support the router during this operation. Clean out the corners with a chisel and then position the blade. Use light clamping pressure to make sure that the blade is held firmly and that the joint closes completely.

Remove the blade, put the two halves back together and separate the keeper from the handle on the table saw (see Figure 2). Clamp a stop to the miter gauge fence for accuracy and back the work with a hardwood block to minimize tear–out.

Before going any further, mark each of the four pieces clearly for consistency of grain when they're glued back together.

Now clean up the blade with acetone and emery paper to remove all grease, rust and dirt. Mix up a small batch of epoxy and coat one half of the handle only, not the keeper, then do the same to the blade and lay it in the recess. Glue the other side and clamp up. Make sure that the two narrow surfaces at the blade end are exactly aligned—they are awkward to trim later. When the glue has cured, clean these surfaces or the keeper will not seat properly.

Next, prepare the keeper for gluing. First coat the exposed part of the blade as well as the adjacent, end–grain surface with paste wax or Vaseline® so the epoxy won't stick to it. (Yeung uses a mold release wax, available from Mirror Bright Polish Co., Irvine Industrial Complex, Irvine, CA 92662.) Apply epoxy sparingly to the keeper. Clamp it lightly; then push it firmly into place over the blade. It must bear snugly against the end of the handle.

When the glue has set and with the knife assembled, clean up the edges on the table saw and then trim the ends. Glue two thin pieces (about 1/8") of the same hardwood to each end so as to cover the end–grain. Trim these down on the table saw or disc sander until only about 1/16" – 1/32" remains. If you cut into the glue by mistake, clean up the ends and start again.

Round or chamfer the edges of the handle as you like. Finish the wood with Tung oil and then lightly sand it with 600–grit wet/dry sandpaper using the oil as lubricant.

The final step is to sharpen the blade. Lay the bevel flat on an oilstone and then raise it about 5° to create a secondary bevel. Gently hone it at this angle and then turn it over and, *with the blade flat* on the oilstone, hone it again. Touch it up when necessary until it's time to regrind. **PW**

The Finishing Forum

The Finishing Forum is an ongoing discussion about the art of wood finishing. If you have a question or a problem to solve, we'd like to help. If you have a tip or a secret formula to share or if you've recently tried a new finishing product, write to: The Finishing Forum c/o *Popular Woodworking*, 1320 Galaxy Way, Concord, CA 94520. Letters may be edited for publication.

Giving Old Cabinets New Life

Have you a set of kitchen cabinets that are too good to scrap, but not worth the cost of refinishing? Maybe what you need is pigmented varnish. Because you use tiny amounts of pigment, it's nearly impossible to make a mistake. You'll need varnish and four pigments: raw umber (gray–brown), raw sienna (yellow), burnt sienna (red) and thalo blue. One–ounce bottles can be purchased at many paint stores for about $1 each. Unless you want an eccentric color, these four tones in combination will be suitable for just about all cabinet finishes. All recipes calling for partial ounces can be eyeballed direct from the bottle. Thus ⅛ ounce means you use only ⅛ of the bottle.

Look closely at your cabinet finish. Does it have a dark brown hue resembling dark walnut? Or is it more on the light gold side, similar to golden oak? Is it reddish, favoring mahogany? Green or blue? Once you have established the basic tone, you can begin tinting the varnish. You'll need about a pint of interior varnish in a larger container. Cut this about 15% with paint thinner to insure ease of application, and you're ready to make your color. If your cabinets resembled dark walnut, start by adding about ½ ounce of raw umber, ⅛ ounce of raw sienna, and ¼ ounce of burnt sienna. Is your cabinet similar to golden oak? Simply add ½ ounce of raw sienna, and ⅛ ounce of raw umber. Mahogany color is simple: ½ ounce burnt sienna, ⅛ ounce raw sienna, ¼ ounce raw umber. For green cabinets, add ⅛ ounce raw sienna, ⅛ ounce thalo blue, and ½ ounce raw umber. For blue cabinets you need only ⅛ ounce thalo blue and ⅛ ounce raw umber.

Test the color. If it's too light, add more of the darker color in your recipe. Too dark— add more of the lighter color. If you want more opacity, use more colorant in the same proportions.

When you're ready to apply the varnish, brush it on using vertical strokes only. As one door after another is varnished, check for sags and wipe them off with your fingers, not with the brush. When the cabinets are finished, you'll really see a difference—all the scratches and splotches disappear, and all for under $20.

Del Duncan
Truly Persnippity Paint Company
Oceanside, CA

Questions and Answers

English Leather

I have just restored a writing desk that was made in England, late in the 18th century, to the full satisfaction of my customer and myself, but I am not happy with the leather writing surface on the inside of the door. It badly needs cleaning, feeding and care. I suggested replacing it, but the owner doesn't want that. Can you help me?

Mark Stolow, Wheeling, IL

Divide your task in two halves: 1) The cleaning, 2) The feeding–finishing. For a thorough cleaning you must experiment with all proven products, such as detergents, saddle soap, and gasoline. Use these with pumice stone, steel wool, Scotch–Brite®, Bear–Tex® or some other abrasive textile, and I am positive that you will eliminate all surface dirt from the leather top. Concerning the spots within the leather, I agree with the owner. They belong there, just as wrinkles belong on the face of an old person.

For the feeding–finishing I am giving you a formula that I obtained from the chief care–taker of the Royal Palace in Schoenbrunn, Austria, in 1922: Melt 4 ounces of beeswax in a double boiler. Add 4 fluid ounces of pure lemon–oil or cedarwood–oil and 15 ounces of lanolin. When melted and well fixed, away from all fire–hazard, add to it some solvent of your choice (turpentine, mineral spirit, or hexane)—enough to give it the consistency of a smooth paste or cream. Rub this mixture well into the leather, but wipe off all excess. Let me know how you like it.

George Frank

Cleaning an Old Finish

I have a small organ that needs to be "cleaned up." It's over 100 years old and I'm sure its finish has never been touched. I can't completely refinish it because it belongs to another family member who doesn't want it stripped, plus it would be an immense amount of work (velvet behind some of the openwork, etc.). Is there any way to revive the finish without stripping? It's a walnut finish, not crazed, though with some dust and wax buildup in the grooves and small nicks on the protruding parts.

Susan Henning, Lodi, CA

Your organ could very well retain its original finish and your desire to restore it without stripping is sensible. Many perfectly good finishes are ruined because of the current mania for taking everything to the dip–tank. In many cases, with a little elbow grease, the original finish can be revived at a fraction of the cost of refinishing.

Begin by mixing a solution of one part pure spirits of turpentine and one part mineral oil (available at any druggist). This will clean the surface of any dirt or wax buildup that has accumulated over the years, without the irreversible darkening effect caused by many of the finish feeders and oil–based products that were once thought to aid in restoring finishes. Open up and saturate a #0000 steel wool pad with this solution. Divide the work into sections to make it seem less overwhelming and rub one area at a time vigorously. Now sprinkle the area you're working on with rottenstone abrasive powder and continue rubbing until you've removed the surface accumulation. The rottenstone will aid in bringing back the original luster and provide a glass–smooth surface in preparation for the final step. Don't mistake rottenstone (a fine grayish–brown abrasive) with one of the several grades of pumice stone which is a much coarser

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white abrasive powder.) For the difficult–to–reach carved and gingerbread areas, use a medium toothbrush saturated with the solution and a generous amount of rottenstone powder.

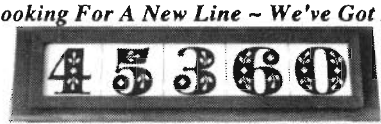
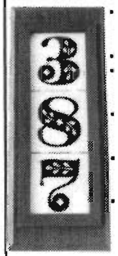
The areas of your organ backed with velvet will be spoiled if you plan to do a thorough cleaning job. You may be able to successfully remove them and glue them back in later. If not, search for an appropriate piece of antique velvet, or age a new piece by soaking it in a strong tea solution.

Check your progress during the process of reviving by cleaning a small area with a soft cloth. Chances are, if the finish has remained intact for a hundred years or more, you can do a considerable amount of rubbing without fear of going through to the raw wood. Remove all traces of the solution from your piece when you are satisfied. You will probably be surprised at how black your rags are. Continue switching to fresh rags until the surface is dry and no more residue comes off.

Finally, apply a coat of paste wax. Choose a color suitable to the tone of wood on your piece (Staining Wax is available in many colors from Liberon Supplies, Box 86, Mendocino, CA 95460). If, for example, your organ is dark walnut with a reddish tone, Georgian Mahogany staining wax would be a good choice. Apply the wax in a circular motion. Use a shoe–polish applicator for the intricacies. Let the wax stand for a few minutes and then buff vigorously—an old terrycloth towel works great. Do a small section at a time so the wax won't dry too hard.

You are now looking at the original finish minus its opaque coating of dirt and wax. The rubbing has brought the finish back to life and the new wax has given it a protective coating while bringing the color to its peak. Any nicks or scratches will disappear in the process. The old finish before you cannot be duplicated—through your patient rubbing its warm glow has been preserved for future generations to enjoy.

Tom Wisshack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Avoiding Brush Marks

I'm presently refinishing a mahogany drop lid desk and having a difficult time with lap marks. I am using 3 lb. cut shellac and a nice badger brush, sanding between coats, but no matter how fast I work, there are always lap marks to sand. Is there a way to avoid them?

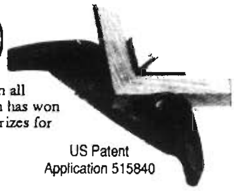
Stephen Gingold, Amherst, MA

The solution is quite simple—don't use a brush! French polish the surface and it will be just as well protected and far better looking. In Europe a few decades ago no woodfinisher could ignore French polishing, and I am convinced that its mastery should be an elementary requirement for practicing the woodfinishing art here, too. In my sixty–some years of finishing, I have probably French polished areas equivalent to two football fields without a single lap mark. The process is a bit too complicated to describe briefly here, so I recommend you study my book, Woodfinishing with George Frank.

George Frank

George Frank *trained in the great wood finishing shops of Europe during the 1920's and 30's. Over the next 40 years he ran his own shops in Paris and New York. He is the author of* Wood Finishing with George Frank *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810).*

Thomas Wisshack *is a furniture maker, restorer, and finisher in Galesburg, Illinois.*



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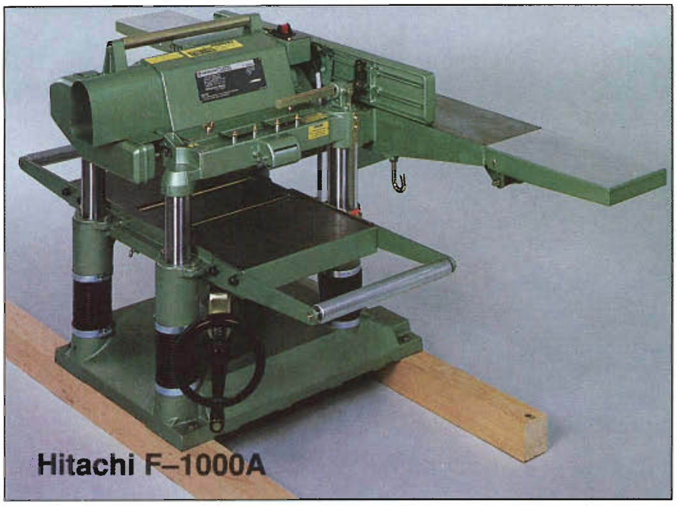


A Jointer/Planer Showdown

Shop space is a rare commodity. How often I've wished for one machine that would take the place of two (or more)! The most popular fulfillment of that need is the jointer/planer. These machines use one motor to handle two operations with only half of the square footage typically required for a jointer and planer separately.

Three Japanese manufacturers currently market jointer/planers in the United States (Hitachi, Makita and Ryobi) but we decided to test only two of the three since Ryobi is in the process of updating their current model. All three companies (currently) utilize a side–by–side design. That is to say, the jointer is mounted on the side of the thickness planer.

For those who aren't well versed in machinery basics, let's go over the functions of both tools. The jointer is similar to the thickness planer in that it utilizes a rotating shaft with knives attached to smooth the stock's surface. It's good for truing, squaring and beveling. The first step in preparing a piece of rough sawn lumber is to run it through the jointer to remove cups, twists and warps. Then you run the stock through the planer until you achieve the desired material thickness. Some woodworkers use their planer like a jointer. By making continuous passes through the planer they may get a smooth surface and might get the faces of the stock parallel to each other, but they won't be able to remove any cup or warp entirely. That's why a jointer and planer partnership is so important. If you make proper use of both machines, the end product will be stock that's finished on all four sides and is flat and true.

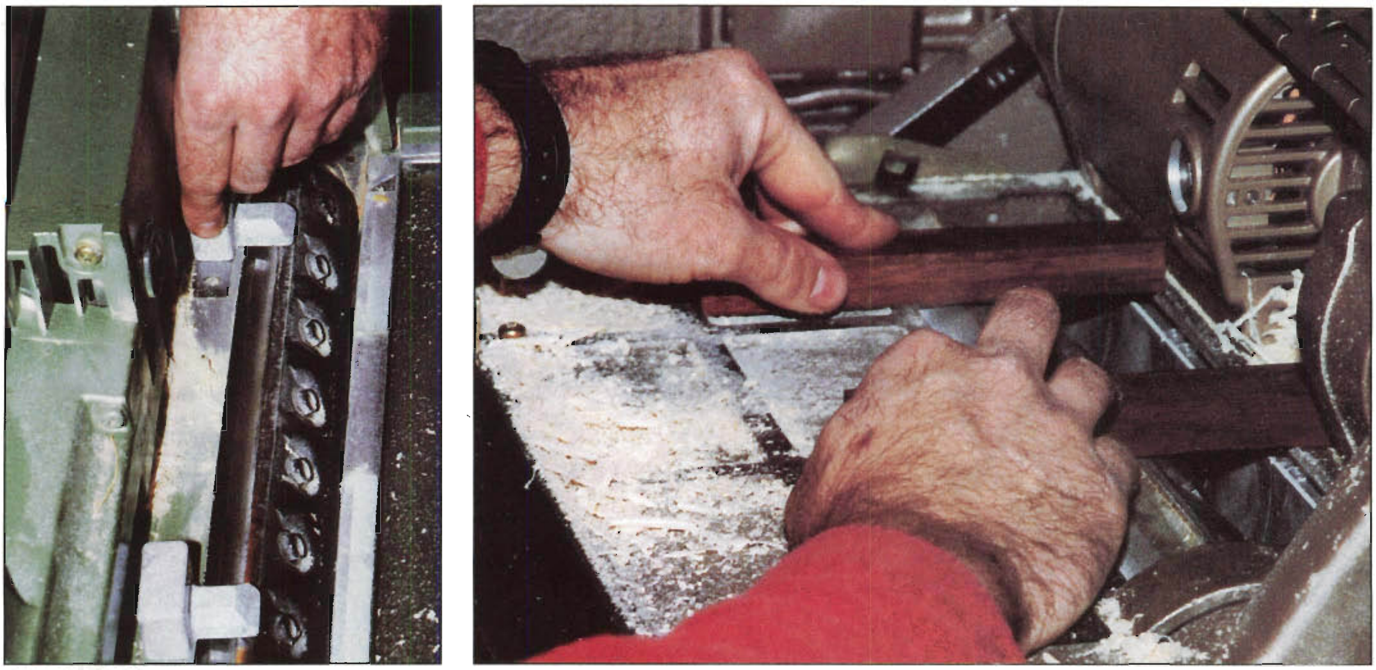
Sanford Wilk, a builder and organic architect in Boston, Massachusetts, heads a team of technicians who evaluate tools under actual working conditions.

Both the machines we tested make use of a rubber infeed/outfeed roller system to pull the stock through the planer. Both tools offer cast iron planer beds that incorporate an additional roller at the beginning of the infeed table and the end of the outfeed table for more support and less material resistance. What's more, they both have two free–spinning rollers located in the planer bed which maintain even pressure on the cutting head and assist the feed rate. Not all thickness planers make use of such rollers. The cranks on these machines are easily accessible, turn smoothly and offer good control.

When it comes to aligning or changing knives, both machines require about the same amount of effort. Both have a shaft lock that makes loosening and tightening cutting knives a bit easier, and both offer basically the same type of knife clamping method. After unplugging the machine, you flip open the cover, lock down the shaft and use a wrench to adjust the bolts that clamp the blades in place. For alignment, Hitachi includes a set of magnetic gauges that hold fast to the frame of the machine while the spring–supported blades rise up to meet the gauge blocks. Makita gives you two blocks of wood to accomplish the same task, but since wood isn't magnetic, their method requires that you hold onto the blocks. This is a bit of a pain. Another major difference between both machines is the diameter of the cutter head. Hitachi's is approximately an inch less in diameter than Makita's, and that seems to affect the quality of the finished cut. We give the point to Hitachi here for surface regularity and smoothness.

The Makita offers two rates of feed (not cutting head speeds) for the planer part of

	Jointer/Planer Specifications	Hitachi F-1000A	Makita 2030 N
Jointer	Max. Stock Width	$6^{9}/_{32}$"	$6^{1}/_{8}$"
	Number of Knives	2	2
Planer	Max. Stock Width	$12^{5}/_{32}$"	$12^{1}/_{2}$"
	Max. Stock Thickness	$6^{9}/_{32}$"	$7^{1}/_{4}$"
	Max. Depth of Cut	$^{1}/_{8}$"	$^{1}/_{8}$"
	Min. Stock Thickness	$^{3}/_{16}$"	$^{1}/_{2}$"
	Feed Rate	26 fpm	17/26 fpm
	Cuts Per Inch	66.6	44.8/68.6
	Number of Knives	2	2
	Amps	15	13
	RPM	10,400	7,000
	Weight	320 lbs	330 lbs
	Suggested List Price	$2835	$3410

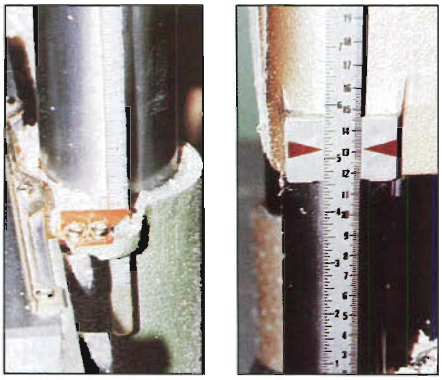


The Hitachi jointer/planer includes magnetic gauge blocks that hold the knives in place while you adjust them. Makita provides wood blocks that help gauge the position of the knives, but since they're not magnetic, you need more than two hands to do the job.

the tool. One speed (26 feet per minute) is for rougher, faster cutting and the other (17 fpm) for slower, more precise planing jobs. At first this sounds dandy—more user control on operating speeds. After testing, however, we thought of it more as a crutch. The rough was too rough, and the slower speed still didn't produce as smooth a surface as the Hitachi's cut at 26 fpm, and was painfully slow at times. That may not seem important but when you're supporting a heavy piece of stock cantilevering over the edge of the infeed table, that additional 9 fpm is welcome.

Hitachi has a higher amp motor (15 amp vs. Makita's 13 amp) but Makita offers an electric brake. Electric brakes are great for circular saws but we doubt that the jointer/planer has much to gain by the additional feature. Yes, there are safety arguments for electric brakes on tools, but the manufacturers that offer them still dub them "convenience" features; in this application so do we.

The pointer on the Hitachi's scale (left) is about 3⁄16" away from the ruler, so it's more difficult to accurately read than is the scale on the Makita (right).



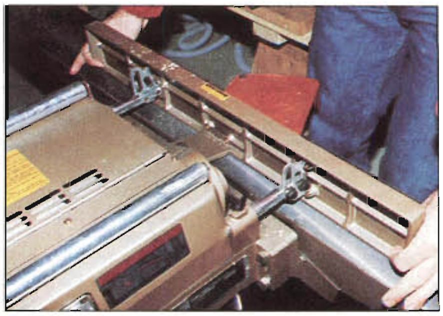
The one place where we have to give real points to Makita is in the scales. Hitachi's gauges are down low and hard to read. In order to get a good look straight on, you have to get down on your hands and knees or bend way over. Both scales read in 1⁄16" increments and in millimeters, but Makita's is about twice as wide, more sturdy and easier to read. Makita also utilizes a better pointer system with easy to distinguish red arrows on both the metric and English scale. Hitachi's pointer travels up and down on the scale with a gap of about 3⁄16" between the back of the arrow and the surface of the rule. This can distort your actual reading if you don't look at the scale head–on.

The top of the thickness planers vary a little between the models. The Hitachi has only one pass–over roller while the Makita unit makes use of two of these passive helping hands. After the cut is complete, you lift the board above the machine and allow the pass–over roller(s) to bear the weight while you propel the stock back towards the starting point. The Makita works better here for a one–man operation because the two rollers allow you to balance the stock while returning to the other side of the machine.

The jointers on these machines are very similar. Their fences are about the same height and length, and both are cast iron. They're attached to two steel rods that slide through the top of the planer. When the fence is extended out over the table, a small door comes down to protect your fingers from the turning knives on the other side.

One major difference is that the jointer bed on the Hitachi unit has a pair of fold–down extensions to make the long bed less of an obstacle in a cramped woodshop. I've heard some criticisms about the fold–down bed never properly aligning after rough shipping, but I can assure you that these claims are fluff. This machine received extreme abuse during shipping (it was rattled down the stairs at one point), and the tables aligned with very little adjustment. Best of all, they have held their positions like the US Marines. In a small shop, these fold–down tables save your kneecaps, and the full length is there when

The jointer fence on both machines (Makita's is shown here) is supported by two rods that slide through the top of the planer.

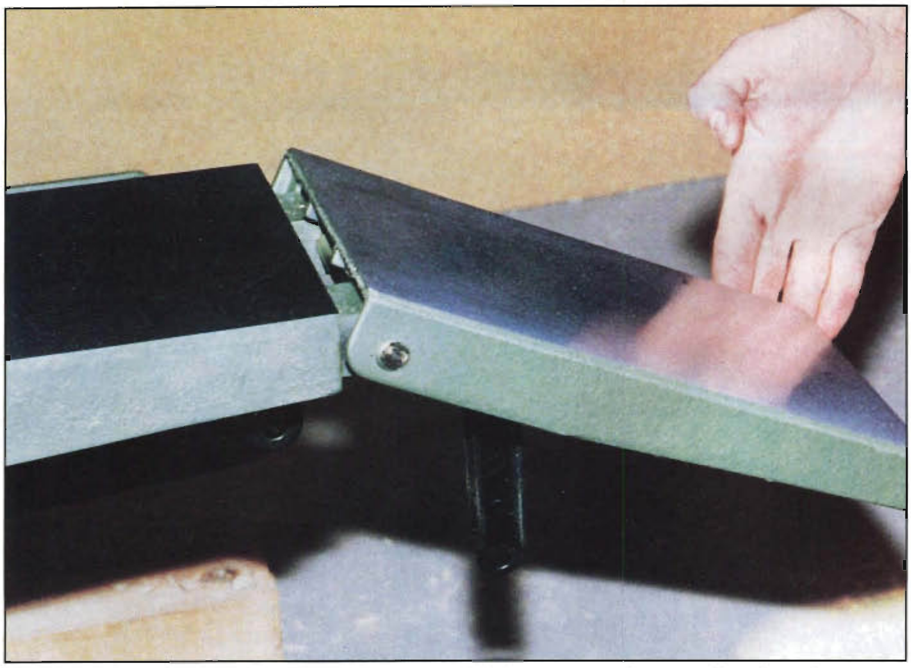


you need it.

Both machines are rather noisy, so use ear protection. If you're going to hook the jointer/planer up to a dust collector (and you definitely should), remember to order the hood that's designed for such vacuum systems. That goes for both machines and the extra cost is worth it. These machines can fill up a large trash can with shavings in just minutes, not to mention the fine dust that poses a serious health risk.

Our choice? We have to go with the more refined Hitachi unit. Yes, the gauges need some help, but Makita couldn't compete when it came down to the finished surface on the stock. Hitachi's milling was barely distinguishable from the kind of finish offered by machines that cost ten times more.

Special thanks to Stanley Black at Trend–Lines, Inc. who assisted us in acquiring test units. PW



The jointer bed on the Hitachi unit features fold–down extensions making it easier to get around the machine in a small shop.

NEWS AND NOTES

Chuck Key Chucker

Ratchkey™ makes bit changing so easy that you'll wonder why someone hadn't come up with it before. It works like a ratchet, so you can quickly insert or remove a bit without changing your grip. (Ratchkey Corporation, Box 80, Accord Station, Hingham, MA 02018, phone 617-871-0930)

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Black & Decker's new Cordless Glue Gun model 201 provides hobbyists, crafters, and do–it–yourselfers with a truly portable butane–powered glue gun with 4 hours running time. This innovative cordless gun is powered by fast heating, disposable Thermacell™ cartridges. (Black & Decker, 10 North Park Dr., Hunt Valley, MD 21030, phone 800-638-0683)

New Catalog

Trend–Lines announces the publication of its new winter 1990-91, 68–page catalog. It offers woodworkers a huge selection of popular name brand tools and supplies at discount prices. This reputable mail order firm offers a 30–day, money–back guarantee as well as a toll–free technical assistance line. (Trend–Lines, Inc., 375 Beachum St., Chelsea, MA 02150, phone 800-366-6966)

Just Roll With It

DeckSlider of Florida announces the introduction of Deck Slider II, a state–of–the–art cargo access and storage system for pickups and vans. It also makes a great roll–out workbench. (DeckSlider of Florida, 771 110th Ave. North, Naples, FL 33963; 800-782-1474) *Wilk's note: I've personally tried this unit and think it's worth a look.* PW

Calendar

Events of Interest to Woodworkers

If your group is having an event you'd like other woodworkers to hear about, send us the facts at least three months before the opening date. We will publish it in *Calendar* free of charge.

California

Date: April 13-14
Show: Santa Clara Valley Carvers
Location: Prospect High, Saratoga
For information: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. Tel. 805-927-4718

Date: April 26-28
Event: Woodworking Show
Location: Civic Auditorium, 145 W. San Carlos St., San Jose
For information: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. 213-477-8521

Date: April 27-28
Show: Sonoma County Carvers
Location: Fairgrounds, Santa Rosa
For information: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. Tel. 805-927-4718

Date: May 3-5
Event: Woodworking Show
Location: Pasadena Center, 300 E. Green St., Pasadena
For information: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. 213-477-8521

Date: May 4-5
Show: Santa Anita Carvers
Location: Santa Anita Park, Arcadia
For information: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. Tel. 805-927-4718

Date: May 4-5
Show: Capital Carvers
Location: La Sierra Community Center, Carmichael
For information: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. Tel. 805-927-4718

Date: May 11 & 18-25
Class: Tool Clinic & Building A 15' Lapstrake Canoe
Location: Hyde Street Pier, SF
For information: National Maritime Museum, Crissy Field, San Francisco, CA 94129. Tel. 415-929-0202

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Date: May 24-25
Show: San Diego Carvers
Location: Balboa Park, San Diego
For information: California Carvers Guild, 250 San Simeon Ave., San Simeon, CA 93452. Tel. 805-927-4718

Connecticut

Date: April-May
Classes: Turning, Band Saw, Patina & Shaker Basketry
Location: Brookfield
For information: Brookfield Craft Center, Box 122, Rt. 25, Brookfield, CT 06804. Tel. 203-775-4526

Georgia

Date: April 5-7
Event: Woodworking Show
Location: Inforum, Atlanta
For information: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. 213-477-8521

Date: April 13-May 11
Event: Woodworking Classes
Location: Atlanta
For information: Highland Hardware, 1045 N. Highland Ave. NE, Atlanta GA 30306. Tel. 404-872-4466

Illinois

Date: April 19-21
Event: Woodworking Show
Location: Odeum, Villa Park
For information: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. 213-477-8521

Maine

Date: April 26-28
Event: Woodworking World
Location: Portland Expo Building, Portland
For information: WANA, Box 706, Route 3 & Cummings Hill Road, Plymouth, NH 03264. Tel. 603-536-3876

Maryland

Date: April 19-21
Event: Arts & Crafts Fair
Location: Gaithersburg
For information: Deann Verdier, 20251 Century Blvd., Germantown, MD 20874. Tel. 540-0900

Date: May 3-5
Event: Crafts Festival
Location: Timonium
For information: Deann Verdier, 20251 Century Blvd., Germantown, MD 20874. Tel. 540-0900

Massachusetts

Date: May 17-19
Event: May Craft Fair
Location: Worcester
For information: Worcester Craft Center, 25 Sagamore Rd., Worcester, MA 01605. Tel. 617-753-8183

Michigan

Date: April 12-14
Event: Woodworking World
Location: Michigan Expo, Detroit
For information: WANA, Box 706, Route 3 & Cummings Hill Road, Plymouth, NH 03264. Tel. 603-536-3876

Date: May 13-21
Class: Building the Norwegian Pram
Location: Charlotte
For information: John Wilson, 500 E. Broadway Highway, Charlotte, MI 48813. Tel. 517-543-5325

New Jersey

Date: April 20-21
Event: Flemington Crafts Festival
Location: Flemington Fairgrounds
For information: United Craft Enterprises, Box 326, Masonville, NY 13804. Tel. 607-265-3230

Date: April 27-28
Event: Meadowlands Crafts Festival
Location: Meadowlands Convention Center, Harmon Meadows
For information: United Craft Enterprises, Box 326, Masonville, NY 13804. Tel. 607-265-3230

Date: May 18-19
Event: Arts & Crafts Show
Location: Verona Park, Verona
For information: Rose Squared Prod., 12 Galaxy Court, Belle Mead, NJ 08502. Tel. 908-874-5247

Date: June 1-2
Show: South Jersey Carvers
Location: Wheaton Village, Millville
For information: William Schade, RD 2, Box 310E, Williamstown, NJ 08094. Tel. 609-881-2402

Date: June 1-2
Event: Arts & Crafts Show
Location: Nomahegan Park, Cranford
For information: Rose Squared Prod., 12 Galaxy Court, Belle Mead, NJ 08502. Tel. 908-874-5247

New York

Date: April 5-7
Event: Woodworking World
Location: Fairgrounds, Hamburg
For information: WANA, Box 706, Rt. 3 & Cummings Hill Road, Plymouth, NH 03264. Tel. 603-536-3876

Date: April
Event: Wood and Tool Expo & Classes
Location: Bronx
For information: Constantine's, 2050 Eastchester Road, Bronx, NY 10461. Tel. 212-792-1600

Date: May 9-August 25
Exhibition: New Furniture
Location: New York
For information: American Craft Museum, 40 W. 53rd St., New York, NY 10019. Tel. 212-956-3535

North Carolina

Date: April-June
Classes: Carving & Turning
Location: Brasstown
For information: John C. Campbell Folk School, Rt. 1 Box 14A, Brasstown, NC 28902. Tel. 1-800-562-2440

Date: May 4-5 & 11-12
Classes: Spoon Carving, Dough Troughs
Location: Marshall
For information: Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753. Tel. 704-656-2280

Date: June 3-14
Class: Furniture
Location: Penland
For information: Donna Jean Dryer, Penland School, Penland, NC 28765. Tel. 704-765-2359

Oregon

Date: April 4-28
Event: Furniture by Dochow & Ross
Location: Hoffman Gallery, Portland
For information: Oregon School of Arts & Crafts, 8245 SW Barnes Road, Portland, OR 97225. Tel. 503-297-5544

Pennsylvania

Date: April 19-21
Event: Woodworking World
Location: Montage Lodge, Scranton
For information: WANA, Box 706, Route 3 & Cummings Hill Road, Plymouth, NH 03264. Tel. 603-536-3876

Ohio

Date: April 13-June 9
Exhibition: Int'l Turned Objects Show
Location: Canton Art Institute
For information: Wood Turning Center, Box 25706, Philadelphia, PA 19144. Tel. 215-844-2188

Texas

Date: April 12-14
Event: Woodworking Show
Location: Convention Center, Dallas
For information: Woodworking Shows, 1516 S. Pontius Ave., Los Angeles, CA 90025. Tel. 213-477-8521

Washington, D. C.

Date: April 18-21
Event: 1991 Washington Craft Show
Location: Smithsonian Auditorium
For information: Smithsonian Institution, Washington, D. C. 20560. Tel. 202-357-2627

Wisconsin

Date: April-May
Classes: Furniture Restoration
Location: Waterloo
For information: Minuteman, Inc., 115 N. Monroe St., Waterloo, WI 53594. Tel. 1-800-733-1776

Canada

Date: April 26-28
Event: SW Ontario Wood Show
Location: Kinsmen Auditorium, Chatam, Ontario
For information: Cryderman Prod., 136 Thames St., Chatam, Ontario, Canada N7L 2Y8. Tel. 519-351-8344

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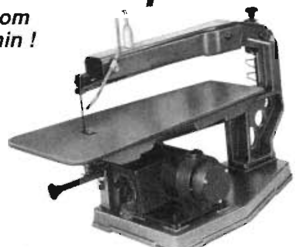

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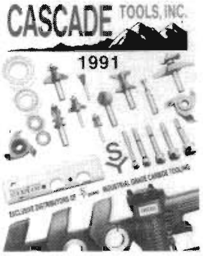

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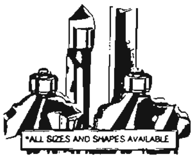
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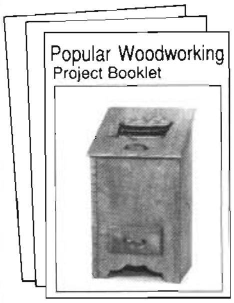

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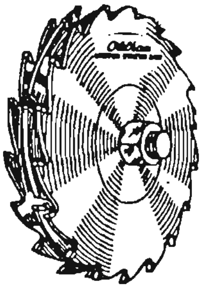

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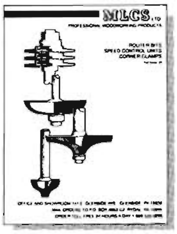

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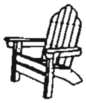

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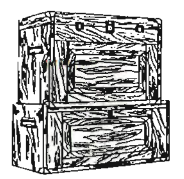

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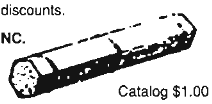

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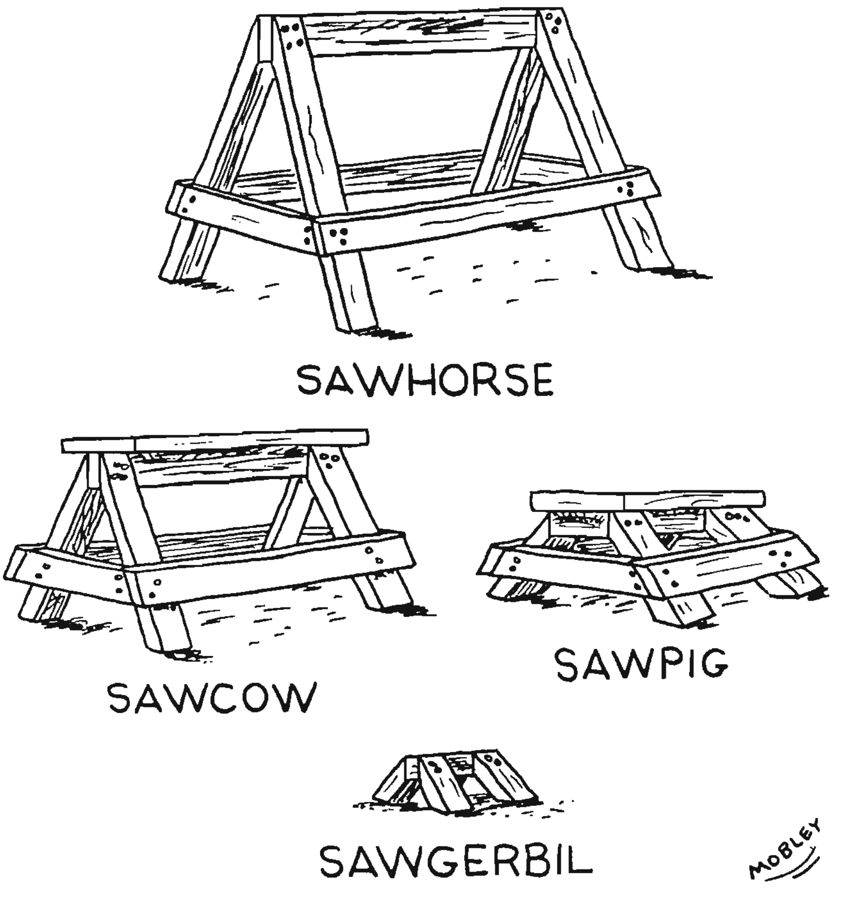
Variations on a Theme

Maple

by Ken Textor

For most people, the word *maple* prompts thoughts of maple syrup or maple sugar. But to woodworkers, it means a lot more. Maple means hard work, generally satisfying results, and a few pleasant surprises including a unique range of grain patterns and colors. The wood is prized for its color variety as well as for the *birdseye*, *curly* and *spalted* patterns found in some maple lumber.

General Description

There are two groups of maples—hard and soft. Their working properties are somewhat different, so it's helpful to know which you're getting. Both are found in the Northeast through the Middle Atlantic, upper Midwest and Lake states. Many lumber dealers prefer to stock the hard variety which includes sugar maple, rock maple, black maple, hard maple, and other local names for the wood. They may mix in lumber from the soft group—red maple, water maple, swamp maple, box elder and silver maple. All are of the genus *acer*, with Latin names such as *acer saccharum*, *acer nigrum*, and so on.

Colors range from nearly white sapwood to a light rose-colored heartwood, often with some shades of light brown. Maple furniture is usually stained in colors ranging from dark brown to nearly black, and even some odd hues of yellowish brown. In spalted maple, pencil-thin black lines of fungus-stained grain produce an effect that many woodworkers like.

The grain can be quite unique. In the non-specialty types it's fairly straight and even. But the specialty types are a real treat for woodworkers. Curly maple gives the appearance of tiny ripples marching across the grain. The pattern doesn't often run for great lengths, which is why curly maple is generally limited to gunstocks, lamp bases, and other short pieces. Birdseye and fiddleback boards are also usually short. The former is distinguished by circular patterns around small black or brown dots—hence the name. Fiddleback has a striped pattern that appears to mirror itself, much like the veneered back of a fiddle. Both are highly prized.

All maples are hard, heavy and strong, ranking near oak and beech for toughness. The hard maples are somewhat tougher than the soft, but for most purposes, either will suffice. Rock maple is the hardest, and is sometimes used to make bearings for machines where sparking from metal bearings could prove disastrous.

Maple is used in all types of furniture, flooring, pallets and crates, as well as for woodenware and novelty items like spools, knobs, spindles and bobbins. It's not very rot-resistant, so avoid using it where it will be exposed to the weather.

Working Properties

Maple can be a challenge. Despite its usual straightness, the grain often reverses unexpectedly, causing boards to leave even a well-sharpened planer with rough or chipped areas. The best solution is to take off very small amounts of wood—1⁄16"—on the final runs through the planer.

Turning and sanding are easier. In both cases, a hard, tight grain is an advantage. Turning shavings tend to come off smoothly so that when you're done, the surface is smooth and requires little sanding. If you do have to sand, the tough, hard surface resists dips very nicely. Planing, sanding and turning the specialty maples require a lot more care since their grain patterns are unpredictable. Take a little bit at a time, work slowly and stop often to inspect the piece.

Maple does not lend itself to bending. In my experience, even very green, well-steamed wood will split 50% of the time when bent more than 20° from the horizontal. Moreover, maple is a somewhat dimensionally unstable hardwood. According to the USDA, it will expand and contract up to 15% in volume. When compared, say, to poplar with a shrinkage of only 10–11%, it's apparent that you should have very dry maple on hand—10% moisture content or less for furniture.

Fastenings are well held by maple, sometimes too well. Start out with the correct size pilot hole, or you may end up twisting screw heads right off or repeatedly bending nails.

Gluing maple can be tricky, particularly with the harder maples. All the usual woodworking glues (epoxies, resins, etc.) will work, but the dense, tight grain means that the manufacturer's instructions must be followed closely.

Finishing

Finishing maple is also a challenge—depending on the desired effect. Whatever finish you select, the final sanding grit should be

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***Ken Textor** is a woodworker and writer in Arrowsic, Maine.*

220 or finer or the very hard, dense surface will show scratches. Maple's subtle shades of pinkish white heartwood will be brought out only by absolutely clear finishes. The pink hue is often lost in the yellowing or browning of urethane, shellac and varnish finishes. Some water–based finishes now on the market provide an absolutely clear finish. In order to heighten maple's pink hue, trim pieces of a darker pink or red wood like red oak or cherry are sometimes included in a mostly maple surface.

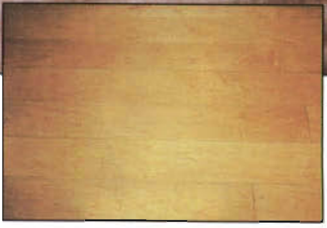
The difficulty in bringing out the natural color often leads woodworkers to staining, and maple stains well. Its hard, dense surface is unaffected by oil–based stains, but water–based stains may raise the grain. If this happens, sand lightly with a very fine grit paper (320 or so) or with steel wool.

Availability

Maple is commonly available as solid lumber and veneers, although plywood sheets are sometimes scarce. Solid lumber is prone to all the usual defects—cups, warps, sweeps, shakes and splits—so check your order. On the other hand, when ordering one of the specialty maples, you can't be overly fussy. Curly, fiddleback and birdseye get their special patterns from growing in unusual ways, which means the lumber will dry unpredictably. Spalted maple is in the earliest, nonstructural stages of rot, and parts of it may be in a more advanced stage of deterioration, with some structural damage evident. Good clear lumber rarely sells for less than $2 per board foot. The specialty lumbers can run as high as $7 or more.

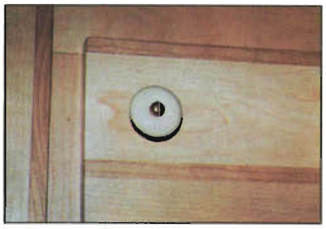
Although the specialty maples tend to be available only in short, relatively narrow *lengths, common* maple is usually available in large widths and lengths. If you're laying a maple floor, however, don't use widths of more than 2½" because of the wood's dimensional instability. You don't want to risk finding gaps between boards in dry weather and raised wood at the joints when the humidity is high.

One further note—if you're concerned that using maple lumber will soon remove the maple syrup from your breakfast table, don't worry. Generally, only the sugar maples produce enough sap for making syrup. And farmers who tap these trees know they are far more valuable as an annual crop than they would be in a one–time lumber sale. PW



author

Up top are two samples of birdseye; above right is fiddleback. The remaining photos show maple in flooring and furniture.



Greg Scharver

Out of the Woodwork

by Elaine Laney

Hands Off!

We'll soon have to child–proof our workshop or move to another city, leaving no forwarding address. Our tiny grandson is growing up. Frequent visits to see "mimi" and "dadaddy" keep us up on his toddling progress. These visits usually occur on weekends when we working folk have the most free time, but it's also the time when our daughter and her progeny are most likely to catch the old folks busy with household chores and odd jobs.

Recently the lure of the woodshop became irresistible and I embarked on the construction of a suet feeder for the small birds who flock to our feeders only to find that the squirrels beat them to it. Our basement shop is a cozy haven where my husband can escape for hours to construct who knows what from materials often salvaged from here, there and yon. All of his small tools are kept in neat Bob–built cabinets, racks on the wall artfully display the larger hand tools, and the freestanding power tools are carefully arranged in one bay of the basement. My favorite is the drill press—the only large power tool I feel completely safe operating. The table saw is featured in my worst recurring nightmare.

Back to the suet feeder. . . . Properly seasoned wood from our own gnarled apple tree seemed an appropriate choice of materials. We had plenty of it, and the Carolina chickadees seemed in complete harmony with that small branch when it was still attached to the tree.

Working with the overhead door open, I was unaware that Melissa and 18–month old Elliott had entered the shop.

She greeted me with a "Hi, mom" as she extended the tot for a grandmotherly kiss.

"Don't touch grammy's drill press!" she admonished as Elliott reached for my machinery instead of me.

His reaction was, of course, natural. The drill press now became even more fascinating than before. They watched me finish drilling the apple branch and we then lingered in the shop awhile. Elliott constantly grabbed for bow saws, jig saws, back saws, hatchets, mauls, axes, and finally settled for investigating small bins of screws and nails—attempting in the process to fill his mouth, nose and ears with them.

Without doubt, as he grows older, more helpful and independent, life will become easier for my daughter and her husband. But as he grows taller, stronger and even more curious, it will become more difficult for his grandparents to store tools out of his reach. I can picture us in our dotage, when we might have trouble even getting down to the basement shop, spending all our allotted hobby time (between naps), looking for tools long ago hidden away from a now fullgrown grandson. We'd better get all the grinding, sawing, sanding and so forth out of our systems soon!

We moved our visit upstairs to the relative safety of kitchen, cookies and milk when it struck me. What a strange, non–traditional grandmother I am for my only grandson . . . perhaps one worthy of a trip to school *someday* for "show and tell" . . . "This is Mimi, my grandmother, wearing her leather tool belt and steel–toed shoes, safety goggles, dust mask . . . ."

Elliott will perhaps forget the milk and cookies, for he'll get that in many other places, but I know he'll long recall his mother's words, "Don't touch grammy's drill press!" PW

***Elaine Laney** is a free–lance writer and the wife of a woodworker in Hendersonville, North Carolina.*

"Ed made it with curly maple."

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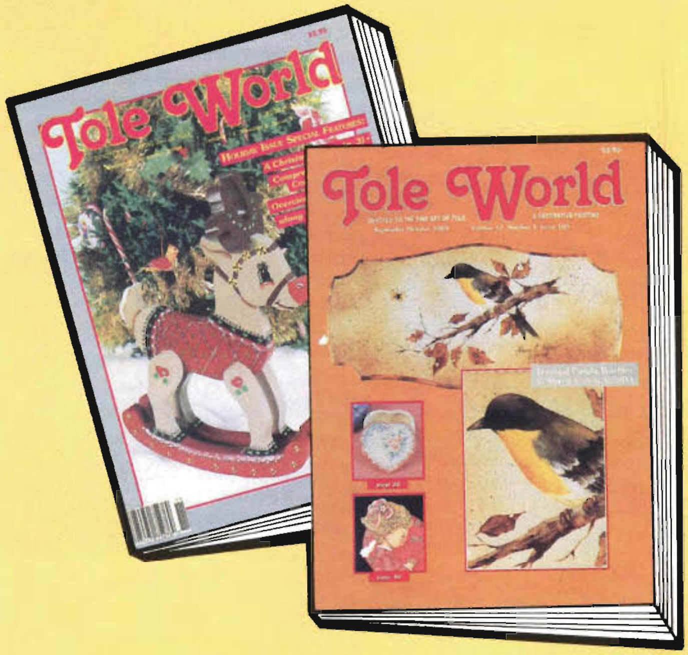

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